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PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1870.

PART I.

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PROCEEDINGS

OF THE

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ZOOLOGICAL SOCIETY OF LONDON.

January 13, 1870.

John Gould, Esq., F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to certain additions to the Society's Menagerie during the months of November and December last. These were:—

1. Six Water-tortoises (*Emys*), presented by the Rev. Basil Wilberforce, November 27th. Upon being taken to the British Museum for identification, four of these animals proved to belong to a new species, which had been described by Dr. Gray at the Society's Meeting in December under the name *Emys flavipes**; and the two others to a species described by Dr. Gray at the Society's Meeting on the 11th of November as *Mauremys laniaria*†. It was unfortunate that Mr. Wilberforce was unable to state the localities of these specimens, which had been purchased from various dealers during the last ten years, some of them having been in his possession for the whole of that period.

2. A specimen of a rare American Monkey, the Ouakari (*Brachyurus ouacari*, Spix), obtained from the forests of the Rio Negro by Lewis Joel, Esq., C.M.Z.S., H.B.M. Vice-Consul at Ciudad Bolivar, Venezuela, and deposited in the Society's Gardens by Mrs. Joel, December 16th. One specimen of this Monkey had been previously living in the Society's Gardens, in 1847, an original drawing

* P. Z. S. 1869, p. 643. † P. Z. S. 1869, p. 499.

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of which by Mr. Richter was now in the Society's Library*. Mr. Sclater remarked that he had little doubt that the *Simia melanocephala* of Humboldt (Rech. Zool. i. p. 316, t. xxix.) was really intended for the same animal, as it was obtained in the same locality (that is, from the Upper Rio Negro), and it was hardly likely that two so nearly allied species could coexist in the same district, the species of this group being remarkable for their distribution in definitely limited geographic areas†.

The following extract was read from a letter addressed to Mr. Sclater by Lord Lilford, F.Z.S.:—

"I notice that in the last part of the Zoological Society's 'Proceedings,' p. 276, you say that the *Otus capensis* sent to me by Major Irby last year was captured on the Rock of Gibraltar. This is a mistake; it was the *Bubo maximus* (which arrived at the Gardens at the same time with *Otus capensis*) which was caught in one of the galleries in the Rock. The *Otus capensis* was one of several which Major Irby shot near Casa Vieja, about fifty miles west of Gibraltar, beyond Tarifa. I have just received from Major Irby a very fine skin of the same species from Tangier. From what I can make out, this bird migrates northwards irregularly in autumn. Major Irby found five or six in a marsh in October 1868, and has failed to find them, or hear of them, in that locality, or elsewhere in Spain, in spring or summer. It is not a common bird near Tangier."

The Secretary read the following extracts from a letter addressed to him by Dr. A. Ernst, C.M.Z.S., dated Caracas, August 20th, 1869:—

"A few days ago one of my collectors brought me a fine male specimen of the *Echimys cristatus*, Desm. It was shot in a spot called the Palmar, which is about 4500 feet above the level of the Caribbean Sea. The animal appears to be very rare in the immediate neighbourhood of Caracas; but I was told it was pretty abundant in the hotter regions of the valley of the Tuy river. Its vulgar name is 'Catiragüa.' The colour agreed pretty well with the only description I was able to find in my books (Boitard, Le Jardin des Plantes, Mammifères, p. 345). I took the following measurements:—From tip of nose to root of tail 28 centim.; tail 22 centim.; distance between the ears 4 centim.; distance between the eyes 2½ centim.; tip of nose to the line between the ears 5 centim.; circumference of body in its thickest part 16 centim. The animal was shot from a tree; its habits are therefore arboreal, as generally in this genus.

"Of Bats I obtained the *Vespertilio lucifugus*, Leconte. In the higher part of the river Catuche, about 6000 feet above the sea, a

* *Cf.* Dr. Gray's remarks, P. Z. S. 1849, p. 9, where there is a woodcut taken from this drawing.

† *Cf.* Wallace, P. Z. S. 1852, p. 108.

dozen of specimens were captured in a small grotto. Most of them were young animals; there was only one full-grown male amongst them. All the specimens were thickly covered by a species of *Nycteribia*; but I was unable to classify it for want of literary apparatus. My identification of the *Vespertilio* mentioned rests on the memoir on American Bats published by Allen in vol. vii. of the Smithsonian Misc. Collect. 55.

"The last steamer from Ciudad Bolivar brought, amongst other things, a few specimens of the *Fulgora laternaria*, L. My correspondent repeats in his letter the fables the Indians relate with respect to this innocent insect; but though he mentions the most marvellous things, he does not speak of any emanations of light. I think such negative evidence is worthy to be taken notice of.

"And last, but not least, I have to add a few lines with respect to a species of *Squilla* which was captured by a fisherman at La Guayra, the sea-port of this town. It is certainly a species closely allied to *Sq. mantis*; but I think it different. There are no traces of the six dorsal lines; the segments are perfectly smooth, whitish, with the exception of the anterior margin, which is of a greyish-blue colour. The posterior margin of the fifth gill-bearing articulation is minutely toothed; the following shows teeth on both edges; and this last segment has in the middle an oval protuberance of a bluish-grey colour, 1½ inch long, and nearly ½ inch broad. The posterior edge of the same segment has on each side three strong inwardly bent teeth, and, between these, two groups of united small teeth. The claws are armed with eight large teeth, excepting the large curved point of the claw. The carapace of the thorax has a deep and broad notch on the posterior edge, and four rather faintly impressed longitudinal lines. The underside of the animal is white; there are distinct bluish markings at the root of the spines in the claws. Length 22 centim. from the point of insertion of the eyes to the posterior edge of the last segment.

"I hope these indications will be sufficient for an identification of the animal with some described species. In case it should not be so, I will try to send you our specimen over to have it duly examined and described."

Mr. Swinhoe exhibited the skin of a Mantchurian Tiger (*Felis tigris*?), measuring 7 feet 8 inches from the nose to the root of the tail, and placed alongside of it the skin of a specimen from India. He pointed out that, with the exception of the face, which had as short hair as that of the Bengal Tiger, the whole of the body of the Mantchurian beast was covered with long softish hairs, and that there was a shaggy ruff about its neck. The specimen exhibited was of a pale colour, with the stripes narrow and indistinct, especially about the shoulders and the hips. Its tail had four narrow longitudinal streaks on the upper surface for the first foot of its length, the next foot was banded irregularly, and the terminal foot regularly, with black and flavescent, ending with a broad black tip. This was the northern race of Tiger, which was tracked by the hunters among

the snows of Mantchuria and Corea. It did not wander south of Peking, but had occurred near Lake Baikal in Siberia, and, it was said, even in the neighbourhood of St. Petersburg. Mr. Swinhoe regretted that he had not yet succeeded in getting its skull. He added that on a former occasion, some years ago, he had exhibited to the Society a skin of the true Bengal Tiger, which was procured at Amoy. This southern race was found from Canton to Shanghai.

Mr. Swinhoe also showed the skin of a Leopard from the province of Kwangtung, very richly coloured and marked, but otherwise agreeing with the Leopard of India; and at the same time laid before the Meeting the skins of an adult and young of the northern Leopard, which Dr. Gray some time since (P. Z. S. 1862, p. 262, Pl. xxxiii.) had described as new (*Leopardus japonensis*), from a skin said to have come from Japan. Mr. Swinhoe remarked that this Leopard differed from the southern race also in its long shaggy hair, in the greater amount of white about it, in its bushy tail, its pale colour, and in the confused massing together of the black spots and circles. The young specimen had all the characters of the adult, except that the markings were indistinct and more in the form of spots.

Mr. Swinhoe stated that the skin before them was procured at Peking, and that the animal was found wild on the western hills near Peking, and in the country to the north (Mantchuria), extending probably to Corea and the island of Saghalien, and perhaps to Northern Japan. It seemed to him that if the northern Leopard was to be recognized as a distinct race worthy of a specific name, so also should the Tiger be. He would do his best to procure the skull of this race, as also that of the northern Leopard, and expected that the osteological characters would confirm the differences shown by the skins.

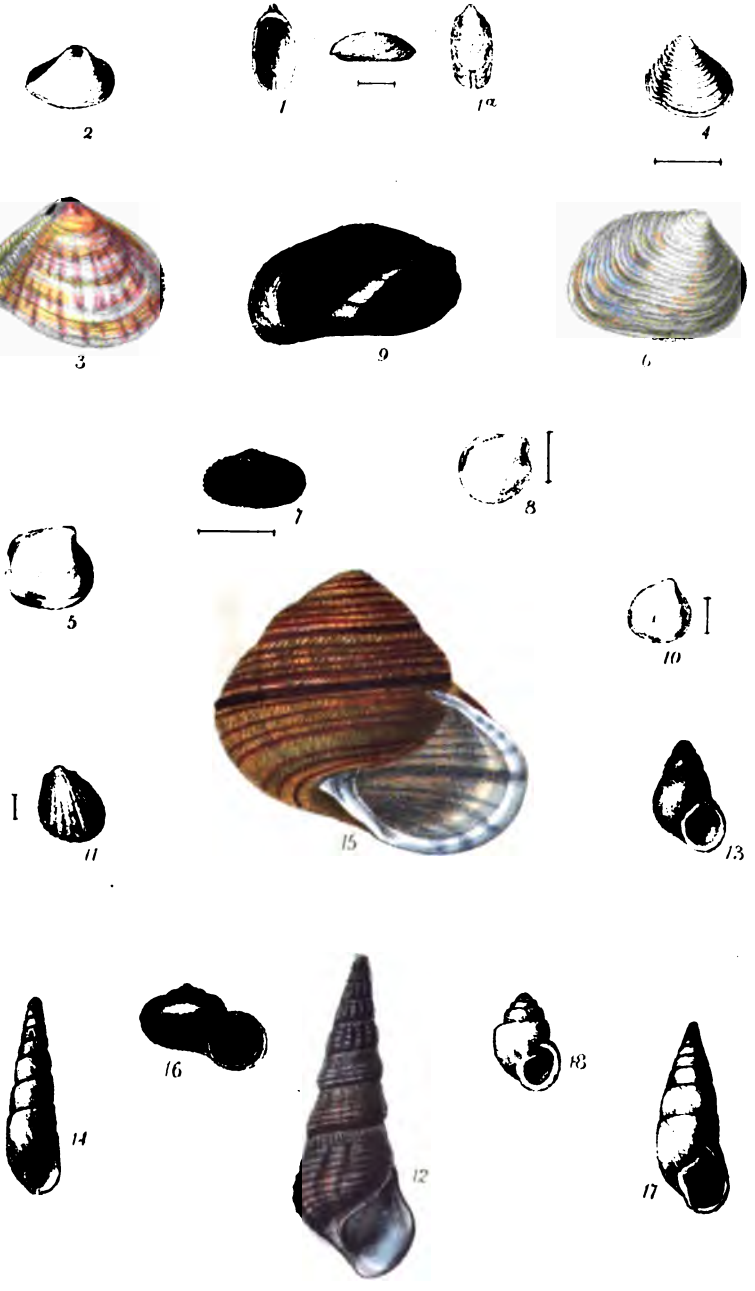
Mr. Swinhoe also produced the stuffed skin of a *Leopardus brachyurus* from Formosa, in which the tail was somewhat long, proving that this race is more akin to *L. macrocelis* than had been anticipated.

Mr. Gould exhibited, and made remarks upon, a specimen of the very remarkable new Pigeon which he had recently described under the name *Otidiphaps nobilis**, supposed to be from New Guinea.

The Rev. H. B. Tristram exhibited two skins of *Aquila nævioïdes* from India, and made the following remarks on them:—

"I have the pleasure to submit for exhibition two specimens of *Aquila nævioïdes*, recently sent to me from Etawah, N. W. Provinces of India, by my friend Mr. W. G. Brooks, C.E. Mr. Brooks had noticed a peculiarly ruddy Eagle in his neighbourhood for some months before he obtained his first specimen; and the bird not being on any Indian list, or recorded from the East, imagined he had discovered a new species. I heard from him last week that he has just obtained a third specimen near Etawah.

* Ann. Nat. Hist. ser. 4, vol. v. p. 62 (1870).



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M & N Hanhart imp

NEW LAND & MARINE SHELLS.

"Mr. Gurney observes that the specimens now exhibited 'appear to be male and female of the true *A. nævioïdes*, identical with those found in Africa. I have never seen this larger race from India previously, or, at least, have never recognized it if I have seen it.

"'The occurrence of these two birds in India raises a curious question of nomenclature. *A. nævioïdes* is undoubtedly far more "*fulvescens*" in its average plumage than the allied smaller Indian race, which you and I have been in the habit of identifying with *Aquila fulvescens* of Gray.

"'But as it now seems that the true *A. nævioïdes* occurs in India, is it not most probable that *A. fulvescens*, Gray, is in reality a synonym of *A. nævioïdes*, and that the smaller allied but less fulvescent bird, which is peculiar to India, should be termed *Aquila vindhiana* of Franklin, without the synonym of *A. fulvescens*?'

"I also exhibit a singular specimen, received from Mr. Brooks at the same time, which Mr. Gurney considers to be a female of *A. vindhiana* of an unusually dark colour, attributable to the plumage being newly acquired after a recent moult. This bird has been considered by Mr. A. Hume to be *A. nævia*, and by others *A. hastata*."

The following papers were read:—

1. Descriptions of a New Genus, and of Eighteen New Species of Mollusks. By Henry Adams, F.L.S.

(Plate I.)

Genus Nesta, H. Ad.

Testa oblongo-ovali, superne convexa, apice terminali, subincurvo, extus decussata, sulco dorsali in fissuram desinente; apertura margine crenulato.

Nesta candida, H. Ad. (Plate I. figs. 1, 1 *a*.)

N. *testa oblongo-ovali, tenui, lirulis elevatis tenuissimis concentricis et radiantibus concinne decussata, nivea; sulco dorsali lateribus distinctis, transverse striato, fissura antica valida; apertura margine postico paulum incrassato, omnino delicate crenulata.*

Long. 5½, lat. 3, alt. 1¾ mill.

Hab. Rea Sea (*Coll. M'Andrew*).

This pretty and delicate little form appears to be allied to *Zeidora*, A. Ad.; but the peculiar internal septum, which is a marked characteristic of that genus, is absent in *Nesta*. It may be considered a communicating link between *Zeidora* and *Emarginula*.

The genus *Zeidora* was obtained by my brother in Japan, where also he met with another singular shell, *Morchia obvoluta*, of which two specimens have been dredged by Mr. M'Andrew in the Red Sea.

CORBULA SULCULOSA, H. Ad. (Plate I. fig. 2.)

C. *testa solida, acuminato-ovata, albida, subæquivalvi, sulcis concentricis subdistantibus ornata; umbonibus medianis, prominentibus, proximatis; latere antico ovali, latere postico acuminato; margine dorsali antice subincurvo, postice arcuato, margine ventrali vix sinuato; declivitate umbonali valde angulata.*

Long. 9, alt. 6, lat. 6 mill.

Hab. Red Sea (*Coll. M'Andrew*).

TELLINA (TELLINELLA) VIRGULATA, H. Ad. (Plate I. fig. 3.)

T. *testa solidiuscula, subovali, subæquilaterali, concentrice conferte lirata, liris postice rugose lamellosis, albida, radiis rubro-fuscis interruptis picta; latere antico ovali, latere postico ad extremitatem subtruncato; plica valida; margine dorsali antice leviter arcuato, postice vix recto; margine ventrali convexo, postice subsinuato; intus albida, ad marginem obscure radiata.*

Long. 25, alt. 20 mill.

Hab. Red Sea (*Coll. M'Andrew*).

TELLIDORA PUSILLA, H. Ad. (Plate I. fig. 4.)

T. *testa parva, subtriangulari, solida, concentrice lamellosa, et inter lamellas tenuissime radiatim striata; lamellis subirregularibus, subremotis, ad latus posticum serratis, pallide flava; umbonibus submedianis, acutis, compressis; margine dorsali antice subincurvato, postice subarcuato; margine ventrali convexo, postice sinuato et angulato; flexura conspicua; valva utraque convexa.*

Long. 10, alt. 10, lat. 4 mill.

Hab. Red Sea (*Coll. M'Andrew*).

The two other known species of this genus, viz. *T. burneti* and *T. crystallina*, are from Mazatlan and West Columbia. In the former, one valve is convex and the other slightly concave, while in *T. crystallina* and *T. pusilla* both valves are convex.

LUCINOPSIS (LAJONKAIRIA) ELEGANS, H. Ad. (Plate I. fig. 5.)

L. *testa parvula, tenui, ovato-quadrata, alba, lineis incrementi conspicuis, remotis, et striis tenuissimis confertis divaricantibus, interstitiis indentatis insculpta; umbonibus medianis, approximatis, prominentibus; lunula elongato-ovali, linea angusta circumscripta; extremitate antica ovali, extremitate postica latiore, vix convexa, cum margine dorsali angulum subarcuatum formante; margine ventrali subrecto.*

Long. 11, alt. 10, lat. 5 mill.

Hab. Red Sea (*Coll. M'Andrew*).

SEMELE MACANDREÆ, H. Ad. (Plate I. fig. 6.)

S. *testa oblongo-ovali, inæquilaterali, solidula, albida, lamellis erectis tenuibus concentricis ornata, interstitiis minutissime radiatim striatis; umbonibus prominentibus, postmedianis, contiguis; margine dorsali postice subrecto, antice incurvato, margine ven-*

trali arcuato; extremitate posteriore subovali, cum margine dorsali angulum formante, extremitate anteriore rotundata; valvis ad marginem ventralem compressis, postice flexuosis et angulo dorsali curvato instructis.

Long. 23, alt. 18, lat. 9 mill.

Hab. Red Sea (*Coll. M'Andrew*).

CHIONE PULCHELLA, H. Ad. (Plate I. fig. 7.)

C. *testa transversim ovali, solidula, convexa, æquilaterali, lamellis concentricis erectis ornata, ad extremitatem posticam validis et granulosis, inter lamellas radiatim striatis, carnea, rubro marmorata; umbonibus medianis; lunula angusta, bene impressa; intus rubra.*

Long. 10, alt. 5½, lat. 3½ mill.

Hab. Red Sea (*Coll. M'Andrew*).

LORIPES DECUSSATA, H. Ad. (Plate I. fig. 8.)

L. *testa subglobosa, solidula, striis tenuibus, elevatis, confertis, concentricis et radiantibus decussata, alba; umbonibus submedianis, elevatis, acutis, approximatis, antrorsum versis; margine interno concinne crenulato.*

Long. 9, alt. 11, lat. 9 mill.

Hab. Red Sea (*Coll. M'Andrew*).

PERNA FULGIDA, H. Ad. (Plate I. fig. 9.)

P. *testa transversa, elongato-ovata, tumida, castanea, nitida, area mediana pallidiore; umbonibus subterminalibus, contiguis, violaceis; margine dorsali in medio obtuse angulato, margine ventrali antice convexo, postice parum incurvato; superficie valvarum sulco levi radiatim bipartita.*

Long. 28, alt. 15, lat. 11 mill.

Hab. Red Sea (*Coll. M'Andrew*).

LIMOPSIS CONCINNA, H. Ad. (Plate I. fig. 10.)

L. *testa solidula, subovali, subæquilaterali, concentrice irregulariter lirata, radiatim confertissime tenuissime striata, alba; umbonibus submedianis, prominentibus, incurvatis; latere antico rotundato, latere postico longiore, ad extremitatem subangulato; denticulis cardinalibus utrinque ad 5; margine intus crenato-sulcato.*

Long. 4, alt. 4, lat. 2¾ mill.

Hab. Canary Islands (*Coll. M'Andrew*).

LIMÆA PECTINATA, H. Ad. (Plate I. fig. 11.)

L. *testa solidula, triangulari-ovata, subæquilaterali, subauriculata, alba, costis radiantibus ad 19, rotundatis, elevatis, imbricatis ornata, interstitiis concentrice laminatis; margine crenato; umbonibus prominulis; area ligamenti vix excavata; margine cardinali vix obliquo, recto, denticulis ad 11 utrinque instructo.*

Long. 2½, alt. 3, lat. 2 mill.

Hab. Red Sea (*Coll. M'Andrew*).

MELANOIDES SWINHOEI, H. Ad. (Plate I. fig. 12.)

M. *testa elongato-turrita, tenuiuscula, spiraliter costata, costis ad basim evanidis, sursum longitudinaliter plicata, epidermide nigro-fusca induta, decollata; anfr. ad* 10 *superstitibus, subplanatis, infra suturam excavatis; apertura acuminato-ovali, antice producta, callo columellari mediocri, intus cærulescente.*

Diam. 14, alt. 43 mill.

Hab. Hainan (*Mr. Swinhoe*).

BITHYNIA ROBUSTA, H. Ad. (Plate I. fig. 13.)

B. *testa late profundeque rimata, ovato-conica, solidula, oblique irregulariter striata et sublente transversim levissime striatula, olivacea, truncata; anfr. superstitibus ad* 4, *convexiusculis; apertura subovali, postice angulata, antice subcanaliculata; perist. continuo, recto, margine dextro intus subcalloso, columellari incrassato.*

Diam. 8, alt. 13 mill.

Hab. Hainan (*Mr. Swinhoe*).

RUMINA (SUBULINA) TERES, H. Ad. (Plate I. fig. 14.)

R. *testa turrita, tenuiuscula, oblique minutim striata, pallide fulva; spira elongata, apice obtuso, sutura subcanaliculata; anfr.* 9, *convexiusculis, ultimo basi attenuato,* $\frac{1}{3}$ *longitudinis paulo superante; columella arcuata, basin aperturæ non attingente, subtruncata; apertura subovali; perist. simplici, acuto, margine dextro sinuato.*

Long. 25, diam. 6 mill. Ap. 7 mill. longa, $3\frac{1}{2}$ lata.

Hab. Hainan (*Mr. Swinhoe*).

HELIX (CAMŒNA) HAINANENSIS, H. Ad. (Plate I. fig. 15.)

H. *testa imperforata, globoso-turbinata, solidula, irregulariter rugosa et cicatricosa, flava, fasciis variis rufo-castaneis ornata; spira turbinata, apice obtuso; anfr.* 6, *convexiusculis, ultimo non descendente; apertura lunato-ovali; columella subverticali, brevi, dilatata; perist. expanso, reflexiusculo, marginibus callo tenui junctis.*

Diam. maj. 40, min. 37, alt. 40 mill.

Hab. Hainan (*Mr. Swinhoe*).

PTEROCYCLOS HAINANENSIS, H. Ad. (Plate I. fig. 16.)

P. *testa depressa, late umbilicata, tenuiuscula, leviter striata, fulvo-lutea, epidermide cornea, laminis distantibus dispositis induta; spira paulum elevata, apice prominulo; anfr.* 5, *rotundatis, ultimo non descendente; apertura obliqua, circulari; perist. duplicato, interno superne breviter inciso, externo expanso, supra sinum latiusculo, subcucullato. Op. arctispirum, extus concaviusculum, marginibus anfractuum laciniatis.*

Diam. maj. 15, min. 12, alt. 10 mill.

Hab. Hainan (*Mr. Swinhoe*).

BULIMULUS DAMARENSIS, H. Ad. (Plate I. fig. 17.)

B. testa vix rimata, oblonga, solida, longitudinaliter plicoso-striata, plicis obtusis, subarcuatis, albida, interdum strigis corneo-fuscis ornata; spira superne attenuata, apice obtuso, corneo; anfr. 10½, *convexiusculis, ultimo* ⅓ *longitudinis æquante; apertura subovali, basi angulata; perist. recto, calloso, marginibus callo junctis, columellari dilatato, appresso.*

Long. 24, lat. 9 mill.

Hab. Damara Land (*Coll. H. Ad.*).

This species is allied to *B. tauricus*, Lang., but differs from it in being less rimate, and in the spire being attenuated at the upper part.

BULIMULUS PYGMÆUS, H. Ad. (Plate I. fig. 18.)

B. testa rimato-perforata, ovata, solida, alba, striis longitudinalibus et spiralibus minutissimis obsolete decussata; spira brevi, convexo-conica, apice obtuso, sutura impressa; anfr. 6, convexis, ultimo ½ *longitudinis æquante; columella subverticali; apertura ovali; perist. recto, crasso, margine columellari arcuato, dilatato, reflexo, perforationem subtegente.*

Long. 13, diam. 8 mill.

Hab. Damara Land (*Coll. H. Ad.*).

DESCRIPTION OF PLATE I.

Figs. 1, 1*a*. *Nesta candida*, p. 5.
2. *Corbula sulculosa*, p. 6.
3. *Tellina* (*Tellinella*) *virgulata*, p. 6.
4. *Tellidora pusilla*, p. 6.
5. *Lucinopsis* (*Lajonkairia*) *elegans*, p. 6.
6. *Semele macandreæ*, p. 6.
7. *Chione pulchella*, p. 7.
8. *Loripes decussata*, p. 7.
9. *Perna fulgida*, p. 7.
Fig. 10. *Limopsis concinna*, p. 7.
11. *Limæa pectinata*, p. 7.
12. *Melanoides swinhoei*, p. 8.
13. *Bithynia robusta*, p. 8.
14. *Rumina* (*Subulina*) *teres*, p. 8.
15. *Helix* (*Camæna*) *hainanensis*, p. 8.
16. *Pterocyclos hainanensis*, p. 8.
17. *Bulimulus damarensis*, p. 9.
18. —— *pygmæus*, p. 9.

2. Description of a new Generic Type of Entozoon from the Aard Wolf (*Proteles*); with Remarks on its Affinities, especially in reference to the question of Parthenogensis. By T. S. COBBOLD, M.D., F.R.S., F.L.S.

On the 4th of November last I received from Professor Flower, F.R.S., a small bottle containing some Nematode worms, accompanied by a letter stating that the parasites had been "found loose in the peritoneal cavity of *Proteles cristatus*." The mere circumstance that the carnivorous "host" had never before been properly anatomized, naturally led Mr. Flower to suppose that the worms would prove new to science; and this inference could hardly fail to be strengthened by the rather uncommon fact of the occurrence of

round worms in large numbers in the general serous cavity of the abdomen. Moreover there had to be taken into consideration the peculiarities of the digitigrade mammal thus infested, its comparative rarity, and also its limited area of geographical distribution, these several influences being unquestionably concerned in the "fixation," so to speak, of the specific form likely to be encountered. It is not surprising therefore that our anticipations in the above relation should have been more or less completely verified; and accordingly it turns out that we here encounter a new genus of internal parasites offering peculiarities of structure, and apparently also of habit, which on the whole suggest a slight approximation to the ordinary filarine genera, on the one hand, but with a closer connexion with the remarkable genus *Dracunculus* on the other. When all the facts bearing upon the genetic relations of the Guinea-worm come to be fully known, it may then turn out that my determinations, in respect of the affinities of the new worm, are somewhat wide of the mark; but, in the meantime, the following data will show the grounds on which I have provisionally asserted this alliance. All the specimens received by me, thirty-four in number, were females; therefore, in the absence of any knowledge of the corresponding male parasites, the following characters must be regarded as applicable only to one of the sexes:—

Order NEMATODA, Rud.

Suborder NEM. PROCTUCHA, Dies.

Family FILARIDEA, Dies.

Subfamily CHEILONEMIDIA, Dies.

ACANTHOCHEILONEMA, g. n.

Head furnished with three spinous lips; body filiform; female endoparasitic in mammals.

A. DRACUNCULOIDES, sp. n.

Body smooth, finely attenuated in front, uniformly thick below; head sharply pointed when the lips are closed, obtuse when exserted; neck spirally twisted in four or five circles; tail abruptly truncate, with a solitary, central, very slightly projecting lobe; no reproductive orifice visible.

Length $1\frac{1}{4}''$ to $2\frac{1}{2}''$; general breadth $\frac{1}{90}''$ to $\frac{1}{80}''$.

This combined generic and specific description, though sufficient for future identifications, may, I think, be profitably supplemented by other particulars relating to size, external form, and general organization, amongst which I have remarked the following:—The head immediately beneath the insertion of the lips measures so little as the $\frac{1}{1000}''$ in diameter, whilst the neck proper gives only twice the same amount of thickness. The tail is fully $\frac{1}{90}''$ in breadth, its feebly pronounced central lobe being no more than the $\frac{1}{260}''$ wide at the base. The mature eggs, or those containing more or less per-

fected embryos, present an average length of $\frac{1}{750}''$ by $\frac{1}{830}''$ in width; but the fully developed embryos, when set free and unrolled, give an average measurement of $\frac{1}{115}''$ from head to tail. The larvæ, however, are remarkably thin, the longest of them not exceeding the $\frac{1}{3000}''$ in thickness; yet, notwithstanding their smallness, they have already attained the general form of their parents, the finely pointed anterior extremity of the body scarcely exceeding the $\frac{1}{10,000}''$ in diameter. In this connexion, I must also not omit to mention that on removing the batch of parent worms from the phial in which they were sent, I observed several of them to be adhering to one another, the various points of union being marked by the presence of minute particles of débris. To the naked eye these particles presented a pale yellow colour, their irregular outline and general aspect suggesting that they were only patches of mucus, connective tissue, or something of that sort derived from the "host" during dissection. However, to my astonishment, on microscopically examining one of these little masses, measuring about the $\frac{1}{30}''$ in length, I found it to consist of thousands of embryos agglutinated together. So consolidated had they become by the action of the spirit in which they were preserved, that I had the greatest difficulty in isolating any one of them; and since, also, they were, individually, much shrivelled and twisted, their measurements could not be very accurately taken. Making all due allowance for contractions and alterations of shape, I did not find that their separate total lengths perceptibly exceeded that of the embryos obtained from the interior of the parent worms. In the mass they were coiled upon themselves and each other in inextricable confusion. I purposely dwell upon these apparently trivial matters because it seems to me of the highest importance to ascertain whether the escaped embryos were, or were not, caught in the act of migrating. They may have accumulated only as the result of accidental evacuation from specimens of the parent worms injured during the dissection of the "host;" in this case, however, though the egg-envelopes would naturally have disappeared, I should probably have noticed some of the freed embryos in a less perfectly developed condition than that in which all of them actually appeared to be. Those who are acquainted with the migratory habits of the Nematode Entozoa will readily conclude that these embryos were, at the time of the "host's" death, accomplishing what, in other cases, has been appropriately termed a "first active wandering" on their own account; and probably a passive transference to some unknown intermediary bearer would, had they lived, have been essential to the further development of these particular larvæ. Be that as it may, in the matter of ascertaining their mode of actual escape (supposing them to have obtained their freedom naturally) there yet remains the rather awkward circumstance that I have not yet succeeded in procuring evidence of the existence of any reproductive outlet in the body of the parent worm.

In establishing a new genus for the reception of this interesting form of Entozoon, some explanation is certainly necessary. At once, therefore, I may remark that I should have preferred to designate

the genus as *Tricheilonema*; and, indeed, I had already so written it, when I afterward found that the late C. M. Diesing had already employed the same generic title for a parasite of a somewhat different type. In his final revision of the Nematoda, communicated to the Vienna Academy in 1860, he places this Nematode (described in his 'Systema Helminthum' as a species of *Filaria*) as the type of his new genus *Tricheilonema*; whilst, unfortunately, in the Introduction or Conspectus of the same revision, this genus, *Tricheilonema*, appears under the synonym of *Schizocheilonema*. This complication of terms is vexatious—the more so since his term *Tricheilonema* would have been much more suitable for the designation of our new parasite than for the particular form of *Filaria* there described as having been obtained from the œsophagus of an Austrian Snake. On the other hand, since Diesing's ready method makes no pretentions towards a natural classification of the Entozoa, and since, also, in the present state of our knowledge, it is much more convenient to utilize his system of arrangement than those of other systematists, there is the less reason to regret the necessary introduction of a new generic term. If Schneider's system be more natural, it is, at all events, much less complete. Without further apology, therefore, on this score, I may also remark upon the great difficulties surrounding a natural classification of the parasitic Nematodes. The variety of characters they display, especially at different stages of their growth, the remarkable disparity of size occasionally shown by the sexes, to say nothing of the still more astonishing fact that the adult female Entozoon may itself occur in two totally distinct forms—all these peculiarities, not to mention many others (associated with or depending upon their migratory habits), add to the difficulties of taxonomy. These instances of dimorphism, it is true, are now no longer believed to be confined to the Nematode Entozoa, certain Entomostraca, Aphides, and Bees; nevertheless the recent additions on this head are mainly a confirmation of the remarkable discoveries of Leuckart and Mecznikow in respect of the life-phases and development of *Ascaris nigrovenosa*. In this connexion one may particularize the observations of Prof. Leuckart respecting sexual dimorphism as it occurs in *Coccus* and in *Chermes*, of Prof. Häckel, who finds the naked-eyed *Geryoniadæ* capable of producing (from the walls of the stomach) medusoids totally unlike their parents, and of Prof. Claus in respect of the Nematode *Leptodera appendiculata*. It was reserved, however, for Prof. Claparède to discover proofs of the existence of similar phenomena amongst the Annelids properly so called. By a recently published brochure (which the author has kindly sent me), I gather that the occurrence of two distinct sexual forms presented by *Nereis dumerilii* does something more than confirm the statements of the above-named authorities, since the dimorphic phases of this singular Annelid have something about them altogether peculiar, if not unique*. The sexually mature *Nereis*, we are told, loses for a time its sexuality, increases in size

* Recherches sur des Annélides (p. 38). Tiré des Arch. des Sci. de la Bibl. Univ. Oct. 1869.

and segmentation, then becomes sexual again, and ultimately has the power of transforming itself into a *Heteronereis*. This would signify little, perhaps, if the two phases were only slightly different in character; but it must be borne in mind that they represent type forms of genera hitherto regarded as utterly disconnected and entirely distinct. If Prof. Claparède's observations and conclusions should be verified and extended by further researches, we shall have fallen upon another page of fruitful discovery bearing upon the so-called law of "alternate generation." In touching upon these genetic phenomena, my object is to bring about a probable explanation in connexion with the development of the parasitic species now before us. From the first, my suspicions were roused by peculiarities of structure observable in *Acanthocheilonema* which forcibly reminded me of *Dracunculus*. Knowing as we do, to some extent, the sexual characteristics of this aberrant parasite, and keeping in view, at the same time, Prof. Schneider's interpretation of cognate facts displayed by the singular genus *Sphærularia*, it occurred to me that the characters exhibited by *Acanthocheilonema* afforded indications of a new and important link in the complex chain of Nematode affinities. Thus all the specimens I have examined are females; the oral, anal, and reproductive apertures are either entirely obliterated, or, from their closure and excessive minuteness, have escaped observation; whilst the whole parasite may be summarily described as an elongated sac, crammed from end to end with embryos in all stages of development. It should not be forgotten that, for a long time, the mouth and even the intestinal tract of *Dracunculus* escaped detection, and at the present hour (notwithstanding Bastian's remarkable discoveries in this relation) the existence of an anal outlet has not been actually demonstrated. The alimentary canal of *Acanthocheilonema* is visible throughout the greater part of its course, but not in the immediate vicinity of the head. One noticeable difference between the two genera consists in the fact that whereas in *Dracunculus* the embryos lie free in all stages of growth in the uterine cavity, in *Acanthocheilonema* they are still surrounded by a chorional envelope. Our new species is therefore an ovoviviparous Entozoon belonging, like *Dracunculus*, to that category of Nematodes which are parasitic only during the propagative state. It is, I believe, maintained by Schneider in the case of *Sphærularia* (his views, however, being opposed to those given by Sir John Lubbock in his admirable memoir on this genus), and by Bastian in the case of *Dracunculus*, that the mode of propagation in these worms is entirely asexual, this opinion having received the general support of Prof. Huxley. For my own part I wish to say that when, in 1864, with a full knowledge of the facts brought forward as regards the Guinea-worm, I offered a contrary interpretation of the phenomena, I did so from no other motive than that of honest conviction; and even now I hold that an exclusively agamogenetic mode of propagation for these worms cannot be successfully maintained. Keeping before us those recent and important additions to our knowledge to which I have here called attention, I am of opinion that *Dracunculus*, in the form commonly known, will

turn out to be but one of two phases of the same female, the parasitic, in contradistinction to the non-parasitic, form, having the power of reproducing agamogenetically. Probably it will eventually appear that other worms known to us only in the female condition are forms of this character. Provisionally I place *Sphærularia* and *Acanthocheilonema* in this category; and should my conception of their parthenogenetic relations be ultimately proven correct, we shall have arrived at the solution of many difficult problems which have been put forward by writers and investigators. For example, as regards the Guinea-worms, Prof. Bastian very naturally asks, "Why are females only discovered in the human body?" and again, "Is there one species of *Dracunculus* only, or are there many, corresponding with different species of microscopic Filaridæ?" If my interpretation of the facts be correct, these and suchlike questions are at once satisfactorily answered. If, as Carter supposes, *Urolabes palustris* be the progenitor of *Dracunculus medinensis*, there can be no impropriety in asserting a similar genetic relation for many allied forms. Not merely may we look to such antecedents in favour of the species already mentioned, but I have little hesitation in claiming a corresponding origin for the so-called "Loa" (*Dracunculus loa*, T. S. C.), which infests the eyes of Negroes of the Angola coast—and for the *Filaria* (*Dracunculus æthiopicus*, Dies.) of Valenciennes, found in the cellular tissue of the extremities and abdomen of a Carnivore from Cordofan (*Felis guttata*). Both of the above are known to science only in the female state; and the same may be said of many other filarine species whose origin, migratory habits, and final destinations necessarily remain, in the present state of our knowledge, a mere matter of conjecture. In conclusion, therefore, let me repeat that I regard *Acanthocheilonema* as a parthenogenetic female whose embryos probably gain access to the outer world by first entering the intestinal canal of the "host," ultimately passing out by the natural passages. In the free state, like *Rhabditis*, they probably give rise to a new progeny by the ordinary sexual process, all or part of this progeny becoming parasitic and parthenogenetic females.

3. Brief History of the Introduction of Salmon (*Salmo salar*) and other *Salmonidæ* to the Waters of Tasmania. By Morton Allport, F.Z.S., F.L.S.

In the year 1841 the late Mr. Frederick Chalmers, of Brighton in Tasmania, who was then Master of a vessel trading from London, applied to Dr. Mackenzie, of Kinellan, by Dingwall, Ross-shire, Scotland, with a view to obtaining Salmon-fry for transport to Tasmania. The fry were not obtained in time for the departure of the vessel, as appears by letters published in the 'Proceedings' of the Royal Society of Tasmania (vol. i. p. 281); and this abortive attempt would scarcely be worth recording but for the curious fact that even

then Dr. Mackenzie suggested the sending impregnated roe as more likely to lead to success than any attempt to carry the living fish. The Doctor's description of his method of impregnating the roe from fresh-killed fish by rubbing it and the milt together would, however, astonish a modern pisciculturist as much as his notion that the impregnated spawn placed in a basket of gravel and hung in the ship's tank could possibly live many days in tropical weather.

In the year 1848 a gentleman belonging to the Tasmanian Survey Department, Mr. James Ludovick Burnett (then on leave of absence in England), visited Mr. Young, of Inverness-shire, manager of the Duke of Sutherland's Salmon-fisheries, and consulted him on the practicability of introducing Salmon and Trout into Tasmania. Mr. Young suggested two methods for trial—one, to bring out the spawn; and the other, to bring young fish. On the whole, Mr. Young gave the preference to the latter method, which is the more remarkable as from the account of one of his experiments it is clear that he had accidentally been upon the verge of discovering the very method which, after many years, led to success. In the experiment alluded to, Mr. Young caused the fecundated ova, packed in baskets of gravel, to be hung in a running stream at different distances from the shore. During a severe frost one or two of the baskets nearest the bank, and which were in comparatively still water, were frozen hard on the surface, and Mr. Young supposed that the vitality of the eggs was destroyed; but he let them remain, and discovered that the only effect of the reduced temperature was to delay the hatching of the ova for several days.

On August 13, 1849, Sir William Denison, then Lieutenant-Governor of Tasmania, wrote to Earl Grey on the subject of the introduction of Salmon, and in his letter mentioned that several attempts had been made to bring out the spawn, but they had all failed. Unfortunately no official record seems to have been kept of such attempts; but they were probably made in some of the vessels employed in the convict-service, and entrusted to men who took little or no interest in the experiment. A long correspondence afterwards took place on the subject, which was wound up on May 16, 1850, by a letter from Earl Grey declining to take any further steps in the matter on the ground that the project of fitting up a welled smack to carry out the living fish, as finally suggested by Mr. Young, would involve too great an expense.

Mr. Burnett and Sir William Denison still firmly believed that Salmon were to be brought out; and that belief culminated in the first attempt, of which any detailed record can be found, to transport Salmon-ova to Tasmania. The Home Government employed Mr. Gottlieb Boccius, under whose superintendence a large oval tub was constructed of wood cased in lead, capable of containing sixty gallons of water besides the requisite quantity of gravel; and on the 31st of January, 1852, this tub, containing 50,000 ova of Salmon and Trout, was shipped on board the 'Columbus' at London, and slung below and on one side of the fore hatchway.

Mr. Boccius, who himself procured the ova, gave minute directions

as to the change of the water at fixed intervals, and warned the captain of the vessel that he might expect the Trout-ova to hatch about the 15th and the Salmon-ova about the 20th of April. On the 1st of March, however, in latitude 14° 30′ north and longitude 26° west, the ova of both began to hatch, and continued to do so for about a fortnight, after which time the water became thick and putrid, the weather being intensely hot. As the ship approached colder latitudes, the water gradually cleared, but no symptoms of life appeared in the tub; and when the vessel arrived in Tasmania, Dr. Milligan, then Secretary of the Royal Society of Tasmania, and Mr. J. L. Burnett carefully examined, first the water in the tub, and then the gravel, but without finding any traces of either spawn or fish.

Mr. Burnett, in an admirably written account of this experiment, published in the 'Proceedings' of the Royal Society of Tasmania' (vol. ii. p. 288), suggested that in future the temperature of the water in which the ova are placed should, if practicable, be regulated by means of ice.

From a letter from the Duke of Newcastle to Sir William Denison, dated the 2nd of June, 1853, enclosing a voluminous report from Dr. Boccius on the causes of failure, it appears that the cost of the experiment in the 'Columbus' was £300, which was charged to the land-fund of the colony.

On the 12th of June, 1852, J. C. Bidwell, Esq., Commissioner of Crown Lands in New South Wales, forwarded to His Excellency Sir William Denison a paper entitled "Notes on the Establishment of Salmon and other Fish in the Rivers of Tasmania and New Zealand," which paper was published in the 'Proceedings of the Royal Society of Tasmania' (vol. ii. p. 326). The following extract will show that Mr. Bidwell was the first person who recommended the exact process by which success was ultimately attained more than ten years afterwards, though several have claimed the merit of the discovery at a later date. "On mentioning the subject of the introduction of fish from foreign countries to the late Earl of Derby, he informed me that he had been extremely unsuccessful in his attempts to breed exotic fish in England; and I do not think that there is an instance of any fish not belonging to the Cyprinidæ having been successfully established as colonists in any country; but I believe the want of success may have arisen almost entirely from the small number of individuals, which, if imported alive, it would be at any time possible to turn loose, and that if thousands could be liberated at once, the chances would be in favour of any predaceous fish establishing itself in a new river in any suitable climate. Now to do this it would be necessary to bring and hatch the spawn. *And I think that by packing spawn in ice there would be no difficulty in preserving its vitality for a much longer time than would be required. It is not probable that the vitality of fish-spawn would be destroyed even by freezing; but by merely packing it in ice there would be no danger of actual freezing, as the ice would always be in a melting state.*"

Thus the whole difficulty was foreseen and provided against; and

it seems marvellous now that Mr. Bidwell's suggestion was not earlier acted upon; but after the paper was read, it was little likely to attract attention, as it was indexed in the volume referred to under the letter B simply as a letter from J. C. Bidwell on the introduction of fish, and was only recently brought to light in the close search for every scrap of information relating to the early history of the Salmon experiment.

Early in the year 1858 the Royal Society of Tasmania appointed a committee of the Fellows to consider certain questions submitted by the then Colonial Secretary relative to the introduction of Salmon into Tasmania and the payment of a reward of £500 voted by the Tasmanian Parliament for such introduction. The report of this committee, dated the 16th of March, 1858, amongst other things, strongly urged on the Government the necessity of providing breeding-ponds for the deposition of ova or fry on their first arrival in the Colony; and on this suggestion the Government afterwards acted.

In the year 1859 Mr. James Arundel Youl, a gentleman who from that date expressed his conviction of ultimate success, and has exhibited untiring zeal and industry in the management of such portions of the various attempts as had to be conducted in Great Britain, prevailed upon a body of gentlemen in England, known as the Australian Association, to take up the cause; and ultimately they despatched about 50,000 Salmon-ova in the ship 'S. Curling' from Liverpool, bound to Melbourne, under the charge of one Alexander Black.

The 'S. Curling' sailed on the 25th of February, 1860, having fifteen tons of Wenham-Lake ice in an ice-house on board to keep down the temperature of the water supplied to the apparatus in which the ova were placed; but on the 24th of April, and the fifty-ninth day out, the last of the ice melted and the last ovum died, no practical knowledge whatever having been derived from the experiment. By some accident no intimation of the intention to despatch ova by the ship 'S. Curling' reached Tasmania till after the departure of the vessel from England; but upon the intelligence being received, and to prevent the loss of any ova which might have arrived, the Government caused suitable ponds to be rapidly constructed on the banks of a small stream known as the "North-west Bay River," about twelve miles from Hobart Town. These ponds were ultimately abandoned in favour of a more suitable site.

In the year 1860 the question of the introduction of Salmon was referred to a joint committee of both Houses of the Tasmanian Legislature; and, acting upon a suggestion of that committee, the Government afterwards appointed a body of Honorary Commissioners to whose management the whole experiment was thenceforth intrusted.

The next attempt was made in 1862, in the 'Beautiful Star,' a small iron vessel of 120 tons burden, built for a steamer, but sent out under canvas.

An ice-house was built between decks, and very elaborate apparatus of two kinds prepared for the reception of the ova, 50,000 in number. In the ice-house a deal box containing ova packed in wet

moss was imbedded, at the suggestion of Mr. C. H. Moscrop, Manager of the Wenham-Lake Ice Company, London, as appears by a letter from that gentleman published in the 'Times' of the 13th of July, 1863. The management during the voyage was intrusted to Mr. William Ramsbottom, who had been engaged in Melbourne and sent to England for the purpose. On the 4th of March, 1862, the 'Beautiful Star' left London, and on the 8th was compelled, through stress of weather, to put back to the Downs; in this short period from 6000 to 7000 of the ova died. On the 13th of March the 'Beautiful Star' left the Downs; and on the 16th the filler-in of the screw propeller was carried away, which compelled her to put back to Scilly for repairs. The vessel left Scilly on the 24th of March, and encountered a furious gale in the Bay of Biscay on the 27th, during which time the ova were destroyed in vast numbers. Fine weather succeeded the gale; but it was manifest, from the delays already experienced and the bad sailing-qualities of the vessel, that the ice could not hold out even to get through the tropics. At the end of April and beginning of May the temperature of the water began to rise, and many of the ova died on the point of hatching, a large number with the head of the fish protruding. On the 8th of May Mr. Ramsbottom, much against his will, was compelled to enter the ice-house to procure blocks of ice, which he placed in the deck-tank, thus reducing the temperature of the water. After using a considerable portion of ice, Mr. Ramsbottom came upon the deal box which had been placed in the ice-house, the lid being broken by the rolling about amongst the ice. Lifting out some of the moss, Mr. Ramsbottom thought the ova looked healthy, and procured a vessel of clean water and placed ova and moss together in it. To his utter astonishment he found nineteen living and healthy ova, which he carefully transferred to the trays in the suspended apparatus.

On the 17th of May the ice was finished; on the same day the temperature of the water rose to 65°, and the last of the ova died, seventy-four days from the commencement of the voyage, and eighty-eight days from the taking of the spawn from the fish. Towards the end of April from three to six of the ova were hatched per day; and thirty of those hatched appeared in perfect health; one lived ten days. The ova taken from the deal box lived nine hours longer than any of the others, and withstood a higher temperature.

Taking into consideration the pertinacity with which a portion of the ova retained life for seventy-four days in spite of the disastrous circumstances to which they were subjected during this voyage, the Tasmanian Salmon Commissioners felt certain that the ova could be introduced, and made a strong appeal to the Government of the Colony to repeat the experiment. Upon receiving Mr. Ramsbottom's report, they decided upon sending him to England expressly to try the experiment of packing ova in ice with a view of retarding their development; and this experiment was accordingly tried in London under the direction of Mr. Youl during the winter of 1862 and 1863.

The wonderful success of that trial, showing that ova may be

hatched safely after being buried in ice 150 days, has been fully published to the world; but why this was likely to prove successful has not perhaps been publicly explained. Even Mr. Frank Buckland, in his book on fish-hatching, speaks of freezing the ova, and thereby greatly misleads his readers. It was long ago shown that actually to freeze ova was to kill them in a few days, or, at most, weeks. The question then was, how could they be kept at an equable temperature just above the freezing-point? If a block of ice (the sensible temperature of which is 32° Fahrenheit) be immersed in water of a higher temperature, a portion of the ice will melt until the heat of the water falls to 32° F., but no more of the ice will be afterwards melted until the temperature of the water is again raised. If the ice could cool the water below 32°, a portion of the water would be frozen; but to effect this, a further portion of the ice must be melted, and water at 32° is not capable of melting ice. If vessels containing creams be immersed in ice for a month, no change takes place in their contents; but convert a portion of the surrounding ice to water by the admixture of any deliquescent salt, and the submerged creams are instantly frozen. Therefore by this beautiful provision of nature any substance above the freezing-point buried in ice can never fall to the freezing-point till the ice next to it is converted to water; and so long as any ice remains, the buried substance will continue at a low temperature certainly, but above the freezing-point; and to this principle success was due.

After many interviews with the owners of various ships, Mr. Youl (to whom Tasmania is greatly indebted for his determined perseverance in this respect) received the munificent offer from Messrs. Money, Wigram, and Co. of 50 tons of room gratis in their clipper-ship 'Norfolk,' bound to Melbourne. An ice-house capable of holding 30 tons was built in a situation admirably chosen for the purpose—on the lowest deck, amidships, and equidistant from stem and stern, in the position in which the motion of the vessel would be least felt. With much difficulty, and at the cost of great personal exertion on the part of all concerned, about 90,000 ova of the Salmon (*Salmo salar*) and about 1500 ova of the Trout (*Salmo fario*) were obtained and safely packed in deal boxes, each a foot long, 8 inches wide, and 4 inches deep. In some of the boxes a layer of charcoal was first placed on the bottom, then a layer of moss damped in pure water; then ova were lightly placed on the moss, and the whole covered with another layer of damp moss, upon which the lid was screwed down. In the remaining boxes the charcoal was omitted, the packing otherwise being the same. Through the lid and bottom of each box several small holes were drilled; and all the ova were packed in 181 boxes. The boxes were next placed on the bottom of the ice-house, which was filled up with Wenham-Lake ice, and the whole securely closed. All being complete, the vessel sailed from London towards the end of January 1864, and left Falmouth on the 28th of that month. On the 15th of April the 'Norfolk' arrived in Melbourne. On the next day the ice-house was opened and the small boxes unpacked. The lid of one box was then re-

moved by Mr. Ramsbottom with fear and trembling; but, to his great satisfaction, a large number of the imbedded ova were found to be alive. Eleven of the small boxes were then left in Melbourne; and the remaining 170 were placed on board Her Majesty's colonial steam-ship 'Victoria,' in large open packing-cases with holes drilled in the bottoms. Broken ice was placed on the tops of the small boxes in each packing-case, larger ice was piled on the cases, and the whole were then covered with bags of sawdust and blankets; about half the ice had melted during the voyage. On the 17th of April the 'Victoria' left Melbourne, and arrived at Hobart Town on the 20th. The packing-cases and ice (of which latter there still remained more than ten tons) were then carefully placed on a barge packed as before, and were towed to New Norfolk, twenty miles further up the Derwent than Hobart Town, by the steamer 'Emu,' which was detained till a late hour on the night of the 20th on purpose. From New Norfolk the barge was towed by boats to the falls three miles further up the river on the morning of the 21st; and the packing-cases were then landed and slung on stout poles and carried by hand to the ponds already prepared at the river "Plenty," three miles further up. The remaining ice was transferred to the ponds in carts, the contents of each being well covered with straw. The first batch of cases arrived at the ponds about the middle of the day on Thursday the 21st of April, 1864, ninety days after the placing of the ova on board the 'Norfolk.'

On their arrival, Mr. Ramsbottom immediately proceeded to prepare the gravel-beds for the reception of the ova. A slight description of the ponds is here necessary. These ponds are twenty-six miles from Hobart Town, and were arranged in accordance with designs brought from the Stormontfield establishment on the Tay. Water is led from the river Plenty by a race to a small plot of grass-land above flood-mark. Sluices are placed on this race to regulate the supply of water. From the main race a smaller one leads directly into the clearing-pond, which is circular, about five feet deep, and forty feet in diameter. Thence the water is led by two covered wooden troughs into an open wooden trough at right angles with the covered troughs. From the open wooden trough small sluices let off the water in any quantity desired directly into the gravel hatching-beds. These consist of wooden boxes about 5 feet long by 2 feet wide. There are twelve of them, arranged in four rows. The water passes with a slight fall into the upper end of the first box in each row, over the lower end of that box into the upper end of the second box, and so on to the lowest, where the water from each row passes over a series of shallow gravelly pools to a pond about 120 yards long and 40 feet wide, varying in depth from 2 to 9 feet. All the surplus water from the clearing-pond also finds its way into this larger pond by a covered drain, ensuring a permanent supply of clear cool water. All the entrances to and exits from the pond and hatching-beds are carefully guarded by covering them with perforated zinc. As the day on which the first of the ova arrived at the Plenty was warm, with a

bright sun shining, a tent was erected over the gravel-beds, the temperature of the water in which was found to be 55° Fahr. Ice was then freely placed in the transverse open trough at the upper end of the gravel-beds and the temperature thus reduced to 44°. About four o'clock on Thursday, the 21st of April, the first box of ova was opened, and, to the dismay of Mr. Ramsbottom, a very large proportion of the eggs were dead; but in the second and third boxes affairs looked more hopeful, and by the time a dozen were unpacked it was manifest that a large proportion would be saved. In unpacking, as soon as the lid of each box was unscrewed, the top layer of moss was quickly removed, and the lower layer of moss with the ova was then lifted out, and at once turned upside down on to the cool water running over the gravel-beds. By this means the ova soon separated from the moss, and distributed themselves amongst the gravel, after which the moss was carefully removed bit by bit. The unpacking was continued by candle-light through a great portion of Thursday night, and was renewed at daylight on Friday morning. By Friday night the last of the boxes were finished, and Mr. Ramsbottom calculated that about 35,000 living and healthy ova were safely deposited. Of these, only about 300 were Trout-ova, which were placed in a separate gravel-bed constructed on purpose and closed at each end by perforated zinc. The percentage of living ova varied greatly in the different boxes; but the largest number were invariably found in the boxes in which the ova were more thinly scattered amongst the moss, and had been subjected to only just enough pressure to keep them steady.

During the unpacking on Thursday night several living ova were unavoidably picked out and left in the heaps of damp moss beside the gravel-beds through the night. On searching the heaps of moss on Friday morning, several ova were recovered from amongst the moss, and one or two from the stones underneath, and transferred safely to the water.

Bedded in the moss of one of the boxes an English Wasp was found, which evinced slight signs of animation. On placing the insect in the sun for a few minutes it became quite lively and walked quickly away. It is true that wasps are scarcely desirable subjects for acclimatization, but surely this circumstance ought to teach us a useful practical lesson as to introducing valuable insects and other similar organisms, especially in their embryonic stages.

A few of the boxes of ova had been placed in the vaults of the Wenham-Lake Ice Company for six weeks before the 'Norfolk' sailed; and in these boxes, though a larger percentage of ova were dead, the eyes of the fish were distinctly visible in those which were living, the development of the embryo having reached a higher stage.

Before the whole of the ice was used up, the temperature of the water of the river Plenty fell to 42°, and averaged about 47° for some time afterwards. The only object in cooling the water with ice at first was to prevent the transition of temperature being too sudden. For several days after the deposition of the ova Mr. Ramsbottom was busily engaged in removing all dead ova and pieces of

moss, charcoal, &c. from the gravel-beds; and for some time afterwards the average death-rate was a mere fraction; but it increased as the hatching approached.

On the 4th of May, 1864, Mr. Ramsbottom had the high gratification of seeing the first Trout burst its egg in Tasmanian water, and on the following day the first Salmon.

The ova continued to hatch until the 15th of June, 1864, by which time Mr. Ramsbottom (then appointed Superintendent at the ponds) estimated the number of young Salmon at about 3000, and of young Trout at about 50. There are two reasons for the vast difference between the estimated number of living ova and the number of hatched fish:—one, that a large percentage of the most healthy-looking ova turned out absolutely barren through defective impregnation; another, that a large number of deaths occur at the very point of hatching, the embryo dying without being able to free itself from the egg. Early in August the perforated zinc guards at the lower ends of the breeding-boxes were removed and the Salmon-fry permitted to drop down with the stream into the shallows at the upper end of the large Salmon-pond, whence they gradually found their way to the pond itself.

By the end of August several of the Trout (all of which, up to this time, had remained in the trough in which they were hatched) died, and many others showed symptoms of disease. As no cause could be traced for this mortality, a gravelly rill was constructed at the upper end of the clearing-pond, and the entrances to and exits from the whole were guarded with perforated zinc. The Trout were then transferred to the rill; and it was ascertained that so many had hidden away under the gravel that, instead of 50, close upon 300 young fish were counted. In the clearing-pond the young Trout continued to thrive, and grew amazingly, no deaths being observed. Amongst the Salmon the mortality was, up to this time, trifling, being confined to such few weak fish as were driven against the perforated zinc guards and had not strength to fight against the stream.

On the 4th of October, 1864, a leak was discovered, by which a large run of water found its way from the Salmon-pond into the Plenty; and, fearing lest the Salmon should have been escaping, the Superintendent placed a box in such a manner as to intercept any fish passing through. One was soon found in the box, and an attempt was unsuccessfully made to remedy the leak. From the 7th to the 25th of October a trench was cut across the place where the leak occurred, and the defective place puddled, and the leak ultimately stopped; but during these nineteen days 240 fry were captured which had passed through, and it is certain that a very large number had previously reached the Plenty.

Till March 1865 everything continued to progress in a satisfactory manner at the ponds; the young fish, which had been at first supplied with boiled liver powdered fine, were now almost entirely fed on gentles, and up to the 10th of March exhibited all the appearance of vigorous health. From the 10th to the 15th of March no less than forty parr died: all of them appeared plump, well-grown

fishes; and it was difficult to assign any reason for their deaths. Owing to an unusually hot and dry autumn, the Plenty was very low, and the temperature of the water rose above its ordinary summer heat. This may have been the cause of the mortality, especially as the Salmon-pond then consisted almost entirely of still water; and the Commissioners therefore determined to liberate the bulk of the parr at once. Up to the 19th of March nine more fish died; and on that and the two following days the pond was lowered, and 419 Salmon parr were liberated into the River Plenty, half a mile above its junction with the Derwent.

Fourteen of the smallest fishes caught were retained in the pond; and a number which could not be caught, and of which number no accurate estimate could be made, still remained. Many of the parr liberated exceeded 5 inches in length, being then ten months old.

Every thing progressed favourably from the end of March; and on the 23rd of October, 1865, the first fish which had assumed the Smolt dress was seen in the Salmon-pond, and between that time and the end of the year thirty-three fine Smolts were liberated. In January, 1866, some alterations were made in the clearing-pond; thirty-eight Trout (*Salmo fario*) were then liberated into the Plenty, 133 being returned to the pond.

The Tasmanian Government, encouraged by the success of the attempt in the 'Norfolk,' determined to obtain a second shipment, that no chance might be lost of rapidly carrying the undertaking to a successful issue; and on the 8th day of February, 1866, the ship 'Lincolnshire' left Plymouth bound for Melbourne, having on board about 103,000 ova of Salmon (*Salmo fario*) and 15,000 ova of Sea-trout (*Salmo trutta*) stowed in an ice-house of rather larger capacity, but of much the same construction as that built in the ship 'Norfolk' for the same purpose two years before. The whole of the arrangements for shipping were superintended by Mr. James A. Youl, who again exhibited the determined zeal upon which so much depended in the former experiment. The method of packing the ova in the boxes and the boxes in the ice-house was identical with that adopted in the 'Norfolk.' After a rather long passage of seventy-nine days, the 'Lincolnshire' arrived at Hobson's Bay on the 30th of April, 1866, and the ova and ice were at once transhipped to the steamship 'Victoria,' again most liberally placed at the disposal of the Tasmanian Salmon Commissioners by the Victorian Government, and arrived in the Derwent on the 4th of May, and by 8 P.M. on the following day the last of the ova were placed in the hatching-boxes at the Plenty, the water, by the help of the remaining ice, being reduced to 45° F.

One remarkable fact in this experiment was the forward state of the larger portion of the ova, the fish being distinctly visible, furnishing abundant proof that a large number, at any rate, had been successfully impregnated. This was especially observable in the Sea-trout, the pupils of the eyes in which last stood out as black spots on a yellowish-white ground, the enveloping tissue being more transparent than in Salmon-ova.

The proportion of living ova deposited was estimated at above 45 per cent. of all sent out. Since the deposition of the ova in April, 1864, several great improvements had been effected by the Commissioners in the arrangements at the Plenty, the chief of which was the alteration of the gravel in the breeding-boxes. To explain the change and the advantages of the present plan, it must be remembered that in its own rivers the Salmon chooses for its spawning-beds shallow rapids running over a bottom of coarse river-gravel, consisting of pebbles weighing from half a pound to three or four pounds, the spaces between which are of course large enough to permit the ova to roll down to depths varying from a few inches to a foot and a half. This is no doubt a wise provision of nature for the protection of the ova and the helpless young fry from their innumerable natural enemies, but has serious objections in artificial rearing. To begin with, it is absolutely impossible, in the first instance, to separate the dead from the living ova; all must be rapidly transferred to the water together, and the dead ova gradually picked out afterwards. In 1864 numbers of dead and living ova together got out of sight between the interstices of the gravel purposely made to resemble as nearly as possible the natural spawning-beds, and much of the living ova was assuredly destroyed by contact with that which was decomposing, to say nothing of the ill effects which the decaying ova would have upon the water generally. Again, it is now an ascertained fact that a considerable admixture of atmospheric air is indispensable in hatching the ova of most of the Salmonidæ, and that, consequently, the further the ova are from the surface of the water, the more tumble and splash you must have in the water to drive bubbles of air through and amongst the gravel. It follows that if in artificial rearing the ova are allowed to get some 3 or 4 inches down into the gravel, a sharp stream of water must be directed over the artificial beds to supply them with the air necessary—but that if it is desired to keep the ova in sight, they must be placed on fine gravel, and an even, gentle stream of water about an inch or an inch and a half in depth must flow through the beds. As in the artificial process the boxes are thoroughly guarded from all possible enemies, the advantages are so manifestly in favour of keeping the ova in sight, that the Commissioners replaced the coarse gravel formerly used by an even bed of very fine pebbles on which the ova rested about an inch from the surface of the stream, which was made to flow gently and evenly through the boxes. The result was, that the moment an egg became opaque, or, in other words, died, it was removed, and all danger to the neighbouring ova was avoided. Besides this alteration, a long series of gravelly rapids, with a few deep places interspersed, was added to the lower end of the Salmon-pond, and a new circular pond with a gravelly rill attached was constructed for the Salmon-trout.

On the 8th of May, 1866, the first Salmon-ovum per 'Lincolnshire' hatched, and on the 12th of the same month the first Sea-trout ovum. By the time all were hatched the Superintendent reported that he had counted up to 4490 Salmon-fry and 496 Sea-trout fry,

and estimated those he had been unable to count of the Salmon-fry at about 1500.

In July, 1866, all the remaining parr, seventy-seven in number, of the shipment per 'Norfolk' were liberated; and every fish showed distinctly the approaching change to the Smolt form.

On the 3rd of July ova and milt were taken from the first pair of Trout (*S. fario*) which ever arrived at maturity in Australia. By the 7th of August fourteen females had been stripped, yielding about 4050 ova. Shortly afterwards five pairs of Trout (ten of the thirty-eight fish turned into the Plenty) were observed constructing rids in that river. The Trout in the river were considerably larger than the largest in the clearing-pond, though several of the latter weighed more than a pound each.

During July and August, 1866, a large number of deaths took place amongst the fry from the last shipment of ova; the total loss being 470 Salmon-fry and 65 Salmon-trout fry.

On the 30th of September, 1866, the Trout-ova taken from the fish in the clearing-pond commenced hatching; but a large number of eggs proved barren.

During August the fry, both of Salmon and Salmon-trout, *ex* 'Lincolnshire,' were permitted to escape into the large pond and the rill attached, with the exception of a few pairs of Salmon-trout, retained in the pond and rill purposely constructed for them in the hope that spawn might be obtained without the previous migration to the sea. From the end of September the operations at the ponds were simply repetitions of what had taken place with regard to the first experiment, some variety occurring through the addition of the Salmon-trout and the occasional capture of large Trout in the Plenty. One was taken on the 13th of January, 1867, 17½ inches in length and weighing three pounds.

Although the bulk of the Smolts of the first shipment left the river in October and November, 1865, and should, according to most authorities, have returned as Grilse in the February following, no report reached the Commissioners of any thing resembling Grilse having been seen. Mr. Ramsbottom always maintained that the Smolts did not return as Grilse in three months, but that they would return in one year and three months; and so convinced was he of the correctness of this view, that he made no systematic watch for the fish in 1866. The mere fact that no report of the fish being seen reached the Commissioners by no means proves that they did not return in February 1866; for it must be remembered that, under the most favourable view of the case, not more than 1000 or 1500 Smolts can have left the Plenty, and were thenceforth distributed over a river but little smaller than the Severn in England, and into which numbers of large tributaries, admirably suited for Salmon, emptied themselves.

In February and March 1867 fifteen persons, including Mr. Ramsbottom, reported that they had seen Salmon or Grilse in the fresh waters of the river Derwent. Several of these witnesses were gentlemen of high respectability; and it is impossible to conceive that

they could have been mistaken, because no indigenous fish in the fresh waters of the Derwent (except Eels) ever exceeds one foot in length or weighs more than three-quarters of a pound.

Mr. Ramsbottom began early in February 1867 to walk morning and evening from his house to the Derwent and back (more than two miles each way) to one likely spot, keeping a regular systematic watch for the Grilse; and the following extract from his journal of March 15 will serve to show the deep interest he took in his work.

"It is with feelings of thankfulness that I can now say I have this day seen a Salmon in the Derwent.

"This morning, after an early breakfast, I started off, for the sixty-ninth time, to the river to look for Salmon. At about 10 A.M. my assistant, J. Stannard, came to me at the Dry Creek and told me that Lumsden (water-bailiff) had seen no less than half a dozen Salmon playing about in the long pool where he was on the look-out this morning. This joyful news again put new life into me; and I at once started off for the spot, as I now meant to see a Salmon if one was to be seen at all during the day. At a little before 12 I took a seat on a log which is in the river about 15 feet from the side, in order to command a good view; here I sat for about two hours under a burning sun, when I heard a kind of rush behind and rather below me. I looked round, and saw it was the motion of a large fish, but could not persuade myself it was a Salmon. In twenty minutes more I saw the partial rise of a fish, head and breast out of water, but could not be sure yet as to whether this was a Salmon or not, as the fish rose at too great a distance from me, and did not make the same splash in the water as I thought a Salmon ought to do; yet the fish looked larger than any I had before seen in these waters, so that I now got very uneasy in mind, sometimes doubting, and at other times believing, they must really be the Salmon; and in this excited and perplexed state of mind I was kept until 3.40 P.M., when, to my exceeding great joy, I was delighted to see nothing else but a Salmon jump clean out of the water, show himself broadside on; and, judging from his appearance, I should call him a Grilse of about 5 lbs. weight. On seeing the Salmon, it is impossible for me to describe my joyful feelings."

Three days afterwards (on the 18th of March) Mr. Ramsbottom saw seven fish rise in the pool above mentioned, two of which he stated positively were Salmon. On the 17th of June, 1867, a large male Trout was found dead in the Plenty. It was a spent fish, much knocked about probably by fighting with other males: it measured 19½ inches in length, and weighed 3¼ lbs. This fish was just three years old.

During June, July, and August of 1867 the Trout (*Salmo fario*) were again stripped of their spawn artificially, about 11,500 ova having been taken from forty-seven fish. After this spawning several of the spent fish were killed and eaten by a family of Yellow-bellied Beaver-rats (*Hydromys chrysogaster*) which found their way to the rill, but which were ultimately trapped and destroyed.

A large supply of this season's Trout-ova was sent to Victoria and

New Zealand; and on the 14th of September the residue commenced hatching. About 2000 young fish were ultimately distributed from this source amongst suitable streams in various parts of Tasmania.

A report having reached the Commissioners that Salmon had been seen at Dunrobin, thirty miles further up the river than its junction with the Plenty, Mr. Ramsbottom was despatched to the spot, and learnt that a young man, a native of the colony, who knew nothing whatever of Salmon, had a month before stated to his employer that he had seen a pair of very large fish on one of the shallows of the river. Mr. Ramsbottom questioned this young man very closely; and his accurate description of what he saw left no doubt on Mr. Ramsbottom's mind that a pair of Grilse had actually spawned in the upper waters; and though the river was too high from recent rain to find the rid, the spot pointed out was one as well suited for spawning-ground as any in the world.

On the 19th of October (the majority of the parr hatched from the shipment of ova per 'Lincolnshire' having assumed the Smolt dress) the perforated zinc obstructions were permanently removed; and such of the fish as chose to leave found their way from time to time into the Plenty, and thence to sea.

On the 10th of November, 1867, Mr. Ramsbottom left the ponds at the Plenty with 270 Trout-fry in an apparatus of his own arranging, and landed in Melbourne on the 15th with 248 living fish, a feat in pisciculture which had probably never been surpassed, and which again proved his peculiar fitness for the position he filled. During the months of February and March 1868 the river Derwent was unusually high, heavy rains having fallen upon the mountain-ranges in which its western tributaries rise; and partly on this account, and partly on account of the serious illness of the Superintendent (Mr. Ramsbottom), no regular watch was kept for the return of the fish: two or three reports only of their having been seen (one from an authentic source) reached the ears of the Commissioners.

On the 27th of June, 1868, a Trout (*S. fario*) was caught in the Plenty, 26 inches long, and weighing 9¼ lbs.

As a large number of the Trout-ova artificially taken during the seasons of 1866 and 1867 proved barren, whereas the eggs naturally deposited in the rill almost invariably contained fish, it was determined to remodel the rill at the upper end of the Trout-pond, and to make it resemble as nearly as possible a series of natural spawning-beds. This was done, and a temporary fence was erected down each side as a shelter, from which the fish could be observed and to prevent their being disturbed while on the spawning-beds. During the winter of 1868 no spawn was taken artificially, but the whole of the Trout were left to their own devices. For more than a month pairs of fish could be seen day after day making their rids and depositing the ova. When the last of the fish had spawned, a perforated zinc guard was fixed across the lower end of the rill, and the old fish thus prevented from leaving the Trout-pond and interfering with the ova or young fish. Large numbers of the ova being required for distribution in Victoria, New Zealand, and Tasmania, the water in

the rill was occasionally lowered, a rid or two opened, and the ova carefully picked out by means of a curved glass tube. Scarcely a dead egg was found; and from one shipment of 800 ova sent to New Zealand, 750 fry were liberated at four months old. In due course the rill became alive with thousands of Trout-fry, which were distributed in numbers of suitable streams and lakes in divers parts of Tasmania. Another large shipment of Trout-fry was also successfully transported to Victoria in Mr. Ramsbottom's apparatus, under the personal superintendence of Mr. John Buckland, one of the Salmon Commissioners, who, out of 226 taken from the ponds, delivered 225 healthy fish to the Acclimatization Society in Melbourne, thus accomplishing even a greater feat than that performed by Mr. Ramsbottom the year before. During this season the numbers of fish seen spawning in the Plenty were amazing; and for several miles up the river, rids were to be seen on every suitable spot. Some of these rids were from 8 to 10 feet long, and must have been formed by enormous fish.

During the winter of 1868 Mr. Ramsbottom, who had long been suffering from lung-disease, became much worse, and sailed for Sydney on leave of absence, in the hope that the change might benefit him; but he died in September, universally regretted by all who knew him or took any interest in the Salmon experiment. In reporting the death of their excellent Superintendent to the Government, the Salmon Commissioners unanimously expressed their sense of his great merit and the loss which they and the enterprise in which they were engaged had sustained in his death.

In October 1868 the residue of the parr brought by the 'Lincolnshire' put on their silvery scales, and took their departure from the pond seawards in the form of Smolts.

During the summer of 1868 and 1869 reports of Salmon or Grilse having been seen were numerous; and in March of the latter year, the river being low and bright, the fish were seen so frequently at a favourite pool near the entrance of the Plenty, that numbers of people used to spend the evening watching for them; and on one occasion no less than twenty people were gratified by seeing several large fish, which could only be Salmon, sporting on the surface and occasionally breaching above the water. Amongst others, several residents on and near the river, who had always been most sceptical as to the presence of Salmon in the Derwent, became converted, and strongly condemned in others that disbelief which they themselves had fully concurred in but a short time before.

At this time the Commissioners and others made many unsuccessful attempts to capture a fish that had returned from the sea. The cause of failure can be readily understood by any one who has seen a large river, the banks of which are, for the most part, in a state of nature. There being an absence of large indigenous fish, no motive has hitherto existed for clearing the dead timber from the stream or the living scrub from the banks; and before either the angler or the net-fisherman can ply his calling successfully, considerable expense must be incurred in preparing suitable stations. It might be thought

that at any rate it would not be difficult to hook a fish, even if it could not be landed; but it must be remembered that the fish to be caught were yet few in number, and that small indigenous fish swarm in myriads, furnishing such a supply of food that no bait will be likely to tempt the Salmon till this profusion is somewhat thinned. It is possible that Grilse or Salmon might have been taken in the tidal waters between Hobart Town and New Norfolk, a great part of which has been and could be worked with seine nets; but the local fishermen had so denuded the river of indigenous species of fair size by excessive netting at all seasons, that they had been for several years compelled to use nets of so small a mesh that even a Smolt could not pass through; and rather than run the risk of sacrificing the whole experiment by the destruction of any of the small consignments of Smolts sent seaward, the Commissioners exercised the power given them by the Legislature, and closed the river above Hobart Town altogether from the time the first batch of Smolts entered the brackish water. All attempts to take fish having failed, when the first rains of winter came on and the fish proceeded further up the river, the Commissioners came to the conclusion that the first undeniable proof they should now get of the success of the experiment would be the capture of Parr or Smolts in the coming spring, as such Parr or Smolts could only be the progeny of fish returned from sea, the last of the Smolts from the transported ova having left the ponds in the spring of 1868 and being therefore either dead or approaching grilsehood.

In June 1869 the Trout again commenced spawning in their rill; and towards the end of the same month five pairs of the Salmon-trout (*Salmo trutta*) formed rids on the shallows attached to their pool, which shallows are now, in October, alive with their fry. The success of this portion of the experiment may therefore be considered as complete as that of the Trout (*S. fario*), as a noble river, the Huon, has been purposely left unstocked, with the intention of turning into it all the Salmon-trout fry except those retained for a breeding-stock.

About the middle of October 1869 a strong freshet came down the Derwent, the result of heavy rains at its sources; and on the night of the 21st of October four fishermen were hauling their seine on a sea-beach about two miles below Hobart Town, and on the opposite side of the estuary of the Derwent. At one of the hauls almost the only fish in the net was a well-grown healthy Salmon-smolt over 10 inches in length, and which, though taken in water as salt as the ocean, had but lately left fresh water; for the silvery scales rubbed off at the slightest touch, showing the colouring of the parr beneath. Half an hour later, and on a beach a mile nearer the town, a second Smolt, not quite so large as the first, was captured. The seine net used was a large-meshed one of an inch from knot to knot, which accounts not only for the capture of a single Smolt at each haul, though they are usually gregarious, but also for the unusual size of the specimens; the probability is that the net had in each instance surrounded a school, but that the ordinary-sized fish had easily passed through, while these two, larger

than their brethren, had been dragged out. The fishermen, well knowing that these were not indigenous fish, made a shrewd guess at the nature of their capture, and, on the 22nd of October, brought them to the Salmon Commissioners, who at once pronounced them veritable Smolts*.

Before concluding, it may be well to state that the whole of the expenses hitherto incurred in the conduct of the experiment between January 1860 and October 1869 amount to £8835 12*s.* 2*d.* Of this sum, £6990 11*s.* 2*d.* was paid by the Tasmanian Government, £995 1*s.* by the Victorian Government, £200 by the Acclimatization Society of Victoria, £300 by the Provincial Government of Canterbury, New Zealand, £200 by the Provincial Government of Southland, New Zealand, and £150 by the Provincial Government of Otago, New Zealand. Credit must also be given to the Victorian Government for the large amount which must have been expended in freight had not H.M.C.S.S. 'Victoria' been twice so liberally placed at the disposal of the Tasmanian Salmon Commissioners.

4. Additional Memoranda as to Irregularity in the Growth of Salmon. By James Murie, M.D., F.L.S., Prosector to the Society.

(Plate II.)

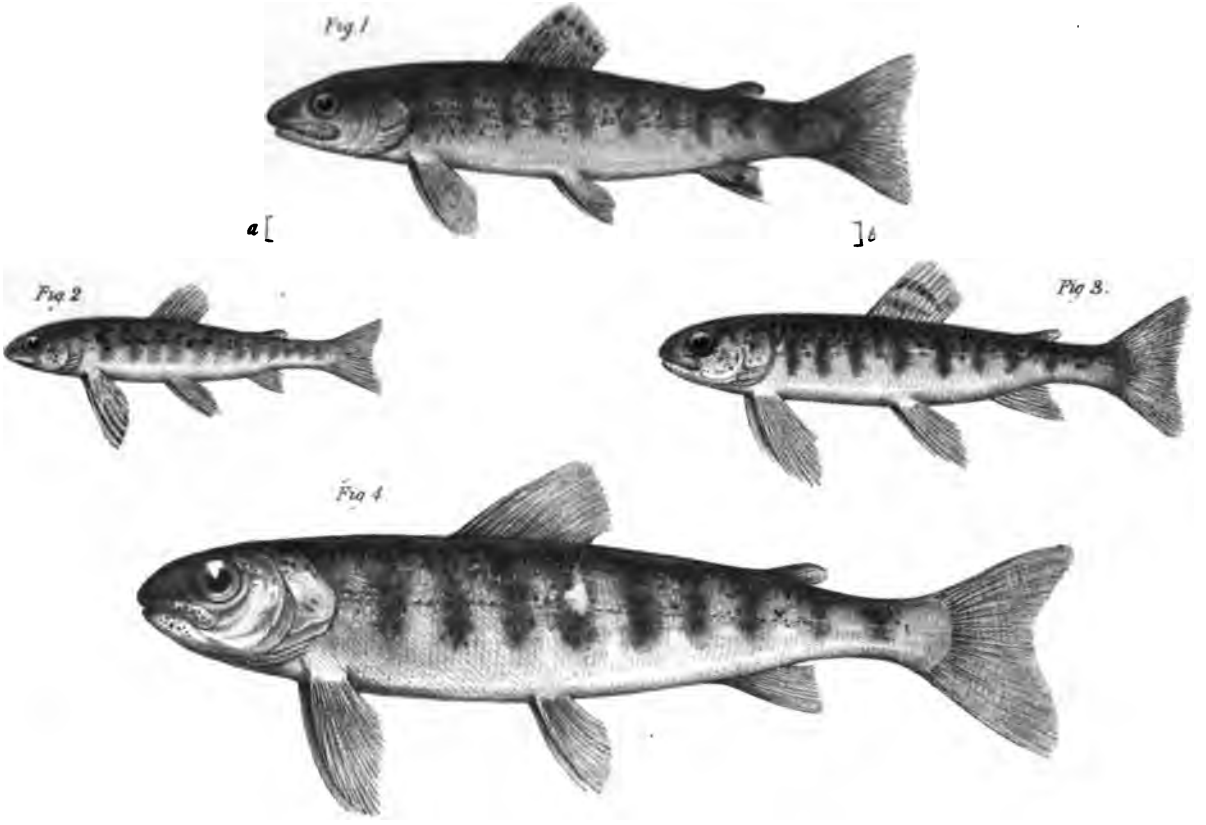
Preliminary Notice.

When I communicated to the Society some observations in connexion with the supposed arrest of development of the Salmon (see P. Z. S. 1863, p. 247), I purposely held back memoranda in support of the view therein enunciated. Having, as it were, registered the data occurring within my own ken, my further intention was to institute a series of experiments, with the object of crucially testing the truth or fallacy of the doctrine.

Unforeseen circumstances happened, depriving me of that auxiliary assistance necessary for the fulfilment of the requisite conditions. But it is probable that other parties may be favourably placed to try the issue of experiments, to set the matter at rest; hence I make note of what seems a feasible plan.

I propose that some one resident close to a Salmon river should obtain a quantity of impregnated and undoubted *Salmo-salar* ova—some of this to be forwarded, and deposited in the tanks at the Gardens, where, after hatching, careful notes of the growth and changes &c. are to be made; due precaution also to be taken that batches of the young fish shall be placed under varied circumstances, *i. e.* as respects the size of the reservoir, food, &c.; on the other hand, the

* [One of these "Smolts" was sent home to be exhibited when the present paper was read, but upon being submitted to Dr. Günther's examination was determined by him to be a dwarfed example of *Salmo trutta*, and not a *S. salar*. —P. L. S.]



C.Berjeau del et lith.

M & N Hanhart imp

SALMONOIDS.

remainder of the ova left in charge of the correspondent to receive widely different treatment—hatching to be carried on in the open air, and the tiny fish, once out, confined in a pond. Reared to the Smolt condition, when the migratory restlessness occurred, some might be marked and allowed to go seaward, the condition of those left behind being noted. During the second or third season, as the case might be, others to be allowed to depart, whilst a few are permanently retained in the pond.

Three years or less from the commencement of the experiment, in the event of a marked grown Grilse or Salmon being caught, specimens from the Society's tanks, the open-air pond, and it to be rigidly compared side by side. In the intervals specimens of the progressive ages and stages to be preserved in spirits, and, as apparent changes take place, figures and annotations thereon duly registered.

The result of experiments conducted somewhat in the above fashion would, I consider, conclusively prove whether or not Salmon are temporarily or definitely arrested in their development when retained for a considerable period in fresh water. At all events all chance of the denial of the parentage of the fish would be obviated.

Or, again, if the breeders of Salmon, say at the stock-ponds in Perthshire, could be induced to fertilize the ova of a full-grown Salmon, and transmit the same to the Society, I venture to say the ova would be attentively watched during the process of hatching, and afterwards the phenomena and stages of growth duly recorded. Furthermore, could the bodies of the parents, male and female, be likewise transmitted to London for identification, all possibility of error would be prevented. As appears plain from what has happened with those already reared in the Zoological Gardens, it is of the utmost importance that the parents should bear witness of the ova being those of genuine *Salmo salar*.

It is, indeed, much to be desired that some such well-attested observations should be pursued; for notwithstanding the asseverations of several trustworthy observers, subsequently to be cited, there still remains a lurking suspicion that error of data may have crept in.

I urge therefore upon pisciculturalists, and such as are interested in solving a physiological, or, rather, zoological problem of high value, the benefit science would derive from the authentication or denial of the alleged circumstantial evidence. This is my plea for intruding the above suggestions and further memoranda upon the Society. I trust that this second notice may stir up those at home, or fish-rearers abroad, to follow out the investigation.

I may premise that I have not entered on the task in a controversial mood, but to incite further research on the matter. Moreover it is possible those interested in the question may wish to refer to the data, be they merely asserted or be they proven, concerning the rearing and detention in pure fresh water for so long a period of fish considered to be Salmon.

It may be pardonable on my part, then, to examine more narrowly than heretofore the grounds of opinion, favourable or adverse, especially as the whole matter is one involving biological laws of the

highest consequence as regards the determination of species, supposed transition of allied forms, and questionable hybridity.

With these remarks I proceed to reproduce my previously suppressed discussion of facts and published data.

Affirmation.

I. *The historical evidence.*—What points to the truth of this (*i. e.* that the fish described are Salmon) has already been given (see P. Z. S. 1868, p. 247); but it undoubtedly contains a weak point; otherwise the whole matter were settled. While the ova received in the Gardens on the 8th January, 1863, may have, as related, veritably undergone all the subsequent changes ascribed, this does not prove their being in the first instance ova of *Salmo salar*. Messrs. Buckland and Bartlett assume them to have been so, and add validity by stating that the size and appearance of the ova convinced them of their genuineness; for the ova of the Great-Lake Trout differ sufficiently to be recognized by the naked eye.

As a sequel to the heretofore described specimens, it is most important to note that one of the fish produced from the ova of the Rhine Salmon, hatched in the Gardens in February, 1863, died on the 1st December, 1867. It was sent to Mr. Frank Buckland, who found on examination that it was a pregnant female. He states that 117 ova, nearly ripe, were present in the abdominal cavity, lying perfectly loose therein. This female weighed 4 oz., and measured 8½ inches in length. Mr. Buckland believes "that, had this fish lived another fortnight or three weeks, these ova would have been quite fit to be deposited in a nest, after the fashion of an ordinary full-grown salmon that had made its two or three journeys from the fresh water to the sea" *.

II. *External resemblances to Salmon.*—It can hardly be denied that, so far as external appearance is concerned, the fishes bear the stamp of young Salmon in the Parr condition. This applies more especially to that figured as No. 1 (Pl. xxiii. P. Z. S. 1868); the other, No. 2 (*l. c.*), is more brindled and spotted than is commonly the case in the Parr; but this in part may be due to the nature of its habitation. The form of the bodies, the relative dimensions of snout to head, head to body, shortness of maxillary, colour of adipose fins, dentition, shape of caudal fins, and contour of præoperculum all agree with *Salmo salar*, and not with other species of *Salmo*.

III. *Published statements and experiments.*—Reference to a few of the better substantiated cases of Salmon reared and continuously kept in fresh water may be interesting at this juncture.

1. Yarrell (Brit. Fishes, vol. i. p. 172, 3rd edit. 1859) mentions that a Scottish landed proprietor in 1831 put some Salmon-fry into a freshwater pond. These were taken out in 1833, to all appearance

* See an account of this interesting specimen in 'Land and Water' for Dec. 7, 1867, vol. iv. p. 320. Preserved in spirits as a preparation, this same fish was shown at the Meeting the evening the former paper was read. It now forms one of the series in the Museum of Fish-culture at the Horticultural Gardens.

Salmon. They weighed from 2 to 3 lbs. each; their flesh was pale in colour.

2. The same acute naturalist has published a separate volume 'On the growth of Salmon in Freshwater' (1839), wherein six coloured illustrations of fish of the natural size, at various stages during the first two years of their growth, are given. The specimens figured show very well the progressive growth and change of dress with age. Yarrell remarks that there is a comparative deficiency of general growth in the older specimens. One of the largest measured 14 inches long and weighed 14 ounces.

3. Lloyd states that near Katenberg there is a salmon-fishery. "These salmon are bred in the lake, and, in consequence of cataracts, cannot have access to the sea." They are small in size and inferior in flavour.

4. I may as well here quote the opinion of another eminent Scandinavian pisciculturist, Prof. Rasch, of the Christiania University. Writing to an English friend *, among other matters he says, "The assertion of some of your countrymen that the Salmon cannot be acclimatized so as to become entirely a freshwater fish is quite at variance with the results of experiments we have made in Norway. Some years ago Hetting hatched out numbers of Salmon-ova, which he subsequently turned loose in the Tyri-fiord; and during the last two years fish have been caught in that lake, resembling in every respect 'Salmon proper.' It is impossible for them, as you know, to return thither, even should they succeed in reaching the sea.

"As regards acclimatizing Salmon to fresh water, our enclosures at Greffsen† are too small. But if in larger pieces of water it be only possible to prevent their first migration to the sea after they have assumed the Smolt dress, they will readily accustom themselves to their freshwater home. And should the water be a very large lake, such as Ladoga, Werner, Peipus, and as rich in nourishing food, the freshwater Salmon will then attain about the same size as the Salmon of the sea."

5. Mr. George Anderson, of Glasgow, communicated the following authentic case to the 'Field' (see 23rd and 30th June, 1866)‡. This gentleman obtained in 1862 about thirty specimens of Salmon parr from the well-known Stormontfield Salmon-ponds §. The fish, as he observes, were then two years old, but had not put on the Smolt dress preparatory to migration.

Twenty-nine of the Parr were placed in a freshwater pond well supplied with Minnows and other food. In June 1866 the pond

* Who, under the initials "N. R. B.," has published the letters in 'Land and Water,' vol. i. pp. 221–245 (March 31st and April 7th, 1866).

† An establishment close to Christiania.

‡ I am indebted to Mr. Charles Darwin for calling my attention to this interesting notice.

§ A pretty sure guarantee that the fish were the young of *Salmo salar*, as it is not at all likely that the trained eyes of Mr. Buist and other experts would be deceived in them—nor, indeed, that ova specially destined to stock the river Tay, and not, as in Huningue, exported, should be chosen from other than pure-bred Salmon.

was run off, when three good-sized Salmon were found to have survived; these were bright, lively, and healthy, but ill-grown. One of these specimens sent to London weighed 15 oz., measured 14½ inches in its greatest length, and had a girth of 6½ inches. The head was 3⅛ inches from the snout to the extremity of the operculum, and appeared large enough for a 5-lb. fish.

It is greatly to be regretted one of these three unusually interesting specimens was not preserved in spirits and forwarded to the British Museum.

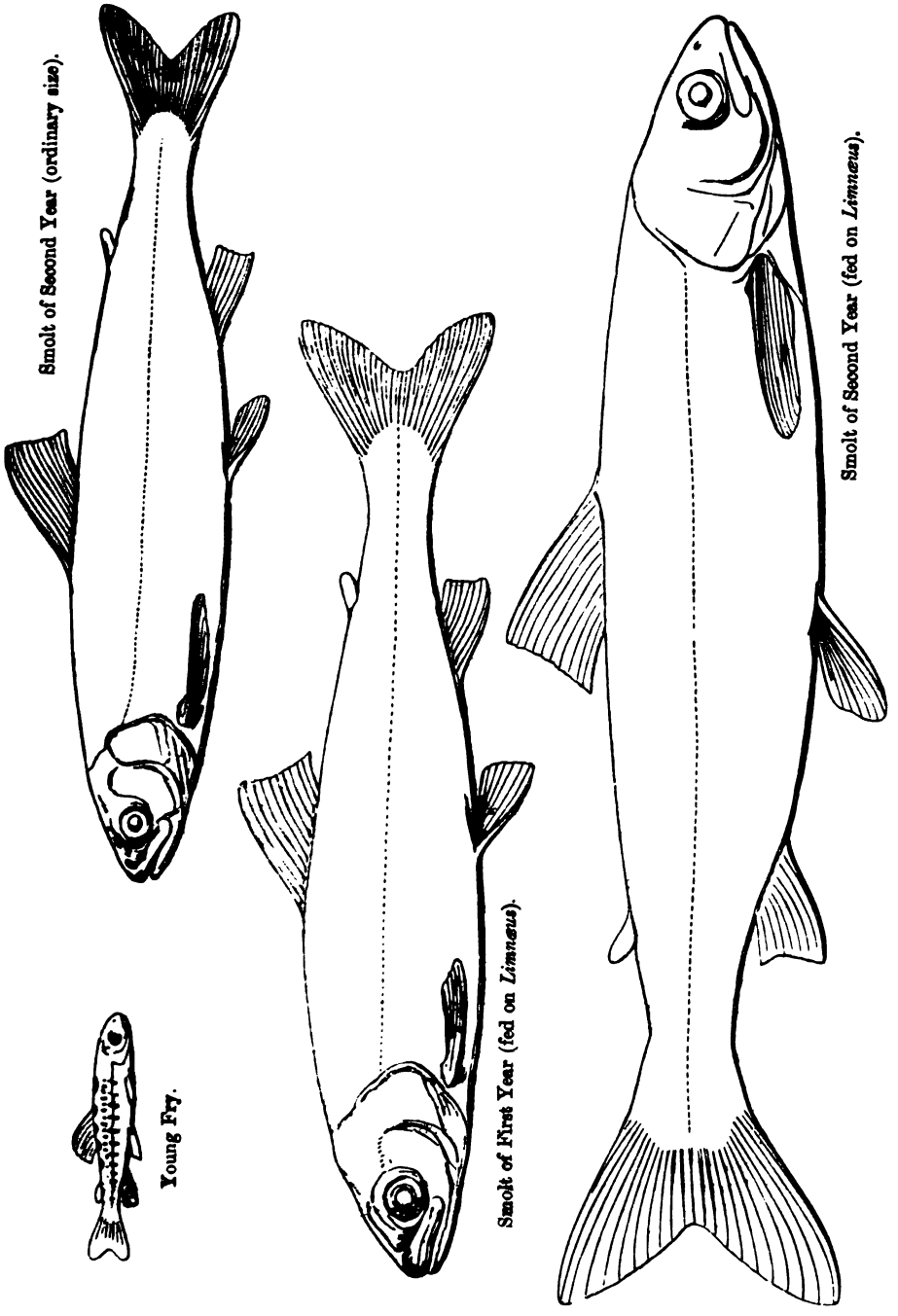
6. Lastly, I shall advert to an account, by Mr. Frank Buckland, of a "Salmon that had never seen the sea"*. This specimen was obtained from the river Wye in 1862, in the Parr condition, and transferred to a pond through which a streamlet of water ran. Four years afterwards it was taken out as a Salmon 11 inches long.

IV. *Irregularity of growth.*—The life-history of *Salmo salar*, as all admit, is a most extraordinary one. The exceeding rapidity of their growth between their descent to and return from the sea is marvellous. But there are still two points as remarkable, viz. that a retardation of development is far from uncommon; and, on the other hand, causes occasionally ensue seeming as it were to stimulate and quicken the usual accession of growth. Since Shaw's experiments on the growth of Salmon-fry †, other observers have noted, and, in fact, it is now universally known to all those practically conversant with artificial Salmon-culture, that of the first year's Smolts only some migrate seawards, while many of them remain behind in the fresh water. In the second year it also occasionally happens that in some fish no desire of migration ensues; but the accession of migratory instinct takes place in the ensuing season, or even later. In other words, some Smolts ripen earlier than others, and those remaining behind, which are slower in their seasonal migratory instinct, remain apparently stationary as to growth. The cause of the retardation of the migratory stimulus, so far as I am aware, has not been satisfactorily accounted for; but clear evidence exists that the young self-detained Salmon are little or no larger than their brethren a year or two younger. Their development is more or less retarded for the time being—but not necessarily continuously so; for as soon as migration occurs, the usual growth concomitant with a sea-water visit takes place. Here, then, we have, from natural causes, retention and arrest of growth of young Salmon in a comparatively healthy condition in fresh water for two years or more. If such a fact or premise be granted, it seems to follow, as a necessary consequence, that if Salmon arrived at the Parr condition be prevented from migrating, they either remain stunted or increase in magnitude in a very diminutive ratio compared with their fellows that have spent a season in the sea-water.

Regarding increase of size generally, and also unusual accretion of growth, in Salmonoids, this, as most authorities agree, is greatly, if not entirely, dependent on the abundance or scarcity of food,

* Figured and described in 'Land and Water,' vol. i. June 2, 1866.

† Trans. Roy. Soc. Edinb. vol. xiv. &c.


Smolt of Second Year (ordinary size).
Young Fry.
Smolt of First Year (fed on *Limnæus*).
Smolt of Second Year (fed on *Limnæus*).

and the extent of the water in which they abide. Many facts might be adduced in support of this; but one of recent occurrence may serve the purpose of illustration*. The experiments at Stormontfield, in Perthshire, already adverted to, are too well known to need further comment; suffice it to say that there can be little doubt of these ponds containing the produce of genuine *Salmo salar*. On the 20th of May 1868, at the above piscicultural establishment, "Peter of the Pools" (the *nom de plume* of an experienced Salmon-rearer) observed great variation in the size of the smolts of the same age—some of the two year-old fish being fully a fourth larger than others, and their bodies proportionally plump. This increased growth was found to be dependent on their feeding on molluscous animals; for in the pond which the large Smolts inhabited vast quantities of *Limnæus peregra* had taken up their abode among the aquatic plants†.

Negation.

I. *Not true Salmon?*—I had Dr. Günther's permission to state that in his opinion the specimens reared in the Gardens (*cf.* P. Z. S. 1868, p. 247) are not true *Salmo salar*, as he considers their history a doubtful one, and furthermore, in some respects, they disagree with the characters assigned by him to that species. He justly lays stress upon the weak point that the ova may or may not have been the produce of a female *Salmo salar*, and may or may not have been impregnated by the milt of a male of the same species. He thinks that among the immense numbers of Salmon-ova yearly sent off from the hatching-establishment at Huningue on the Rhine, there is likelihood of mixture occasionally occurring in the transit, and also that fish which are not true Salmon may be mistaken for them and thus error arise. The chance that fortuitous circumstances might give rise to the last-mentioned error has already to some extent been admitted. It is well to remember, however, that Salmon-ova are distinguishable from those of the Great-Lake Trout, with which they may have been most readily confounded, by their greater size and deeper yellowish tint.

Now as regards constant characters defining the species, and thereby, by the absence of such, excluding the imperfectly developed specimens from being considered as representatives of *Salmo salar*, Linn., I shall take three into consideration—the number of the vertebræ, of the cæcal appendages, and of the scales; the other six characters which Dr. Günther considers trustworthy in the classification of the Salmonidæ are not so applicable in the present instance. A tabular view, moreover, may be more readily appreciated; hence I place in series the formulæ appertaining to true Salmon, our two specimens, and such forms as are the most likely to have been introduced into the Gardens and mistaken for Salmon. The formulæ are

* See 'The Field,' June 13, 1868.

† Through Mr. Tegetmeier's interest, the proprietors of 'The Field' have kindly permitted me the use of their woodcuts illustrating the phenomenon here cited (see p. 35).

taken from Dr. Günther's catalogue; but the upper and lower transverse or oblique series of scales are expressed here in separate columns, and the numbers within brackets are extremes incidentally noted in his description of typical specimens in the collection.

TABLE A.

	Vertebræ.	Pyloric appendages.	Scales.		
			Horis. series immediately above lat. line.	Transv. series.	
				Dorsal fin to lat. line (obliquely).	Lateral line to ventral fin (obliquely).
Salmo salar	59	53–70	120	22–26	19–22
—— ——?, Zool. Soc. spec. No. 1.	59	48–50	120–122	19 (21?)	18
—— ——?, Zool. Soc. spec. No. 2.	60	.....	120	22	.....
—— trutta	59–60	[46] 49–61	120 [117]	24–26 [30]	36–34 [22]
—— cambricus	59	39–47	120–125 [117–130]	27 [25–28]	38–40 [20–24]
—— fario gaimardii	59–60	33–46	120 [124]	27–30 [26]	[22]
—— —— ausonii	57–58	38–47 [51]	120 [117–127]	26–30 [23–31]	[21–27]
—— carpio (Lake Garda)	.....	40–50	123	.....	.....
—— remanus (Lake Geneva)	57–59	45–52	115–128	26–28–36	.....
—— rapii (Lake Constance)	59–60	48–54	120	27–35	.....
—— lacustris (Lake Constance)	60–61	60–61	120	26–30	.....

Tested by the number of vertebræ, the doubtful specimens in question may either be *S. salar* or any other of the species enumerated, excepting *S. fario ausonii*.

The numerical excess or diminution of the pyloric appendages points in the present case to the probability that the two fish are not Salmon. The numbers 48–50 are considerably below the minimum of *S. salar*, but come within the range of the Central-European Lake Salmonoids—to wit, the four last mentioned in the table; likewise *S. trutta*.

One of the most constant characters is said by Dr. Günther to be the size and consequently relative numbers of the scales. In our specimens the horizontal series of these, 120–122, does not exclude the notion of their being Salmon; neither does it show if they are, or are not, specifically separate. The numbers, however, do not tally with the minimum or maximum of several of the species (*vide* Table A), and in this rather agree than otherwise with *S. salar*.

Of the transverse or, rather, somewhat oblique series of scales superior to the longitudinal medio-lateral line, and counted in a row from the dorsal fin to the said lateral line, one specimen (that designated No. 1, P. Z. S. 1868, p. 251) possesses nineteen, possibly more, as shall presently be explained; the other specimen (No. 2, *l. c.*) twenty-two. The latter number is given by Dr. Günther as the numerical minimum of *S. salar*; the former falls three short of it. Hence, as regards this differentiating character, No. 1 apparently

is not a Salmon. It must be borne in mind, moreover, that in my previous communication I stated that the number of scales counted in the specimen was not rigidly accurate, those given as transversely inclined to the long axis of the body being decidedly under rather than above the precise amount. I say so advisedly; for on reexamining specimen No. 1, and taking a linear row of scales slightly in advance of the point previously chosen, and therefore more in accordance with Günther's plane of obliquity, I find that twenty-one or twenty-two (?) are definable. But howsoever this may be, the penultimate column to the right of the table here given (p. 37) conclusively demonstrates that, even in limited numbers of scales, the dubious specimens in question agree less with the undernoted species of *Salmo* than with *S. salar*.

Lastly, this remark applies with still greater force to the scales counted linearly from the lateral line to the ventral fin, with the *proviso* that those of the lake fishes of mid-Europe are unrecorded.

II. *Uncertainty of the species.*—Upon this point it need only be said that, if not *Salmo salar*, it is most remarkable, and fatally telling to the denial of parentage, that the fish correspond to none of the European types, either in size, markings, or other distinguishing characteristics. Had therefore a mistake happened as to the recognition of the ova, this would have ultimately rectified itself in the development of the specific characters applicable to adult piscine form.

III. *The question of hybridity.*—As respects hybridity, which Dr. Günther suggests may be the case with those specimens reared in the Gardens, it becomes rather an important item of deliberation. On what grounds can it be assumed we have hybrid fish to deal with, granting, for the time being, no set line of demarcation proving their identity with a single specific form can be given?

1. The produce of different species may have been fertilized at the Rhine fish-hatching establishment.

2. Instances of hybrids among certain of the Salmonidæ are stated to be of no uncommon occurrence.

3. Our specimens possess resemblances to none of the well-established forms, but have appearances indicating intermediate origin.

As experiments prove, the fertilization of the ova of one piscine form with the milt of another distinct species is beyond controversy exemplified in hybrids between the Salmon and the Trout. It is needless therefore to shirk the reasonable contingency of intermixture of breed having accidentally or intentionally supervened. Against such a circumstance it can be advanced that, so far as is known, the authorities at Huningue did not with intent form a cross breed and transmit the impregnated ova of such to this country as pure *Salmo salar*. Moreover, to the practised eyes of Buckland and Bartlett, the ova were those of Salmon; and the period of hatching coincided with that of that fish rather than with that of the Great-Lake Trout, Charr, Salmon-trout, or Common Trout, received in the beginning of the same year, 1863. This fact also tends adversely to the presumption of accidental hybridity.

Dr. Günther himself professes to have been sceptical concerning hybrid Salmonoids under natural conditions, until convinced, through the Rev. Augustus Morgan, of a cross between the Sewin (*S. cambricus*) and the River-trout (*S. fario*)*.

It is said "These hybrids are so numerous in the Rhymney and other rivers of South Wales, and so variable in their characters, that the passage from one species to the other may be demonstrated in an almost unbroken series, which might induce some naturalists to regard both species as identical." They retain the migratory impulse seawards, and are sexually developed in the autumn,—when young, are like Trout—when older, Sewin. On their first ascent from the sea they are slightly smaller, but closely resemble Sewin. On their second migratory return they are darker and redder than either supposed parent. These equivocal hybrids, W. Peel, Esq., of Taliaris Park, retained for years in a freshwater pond, where they grew from 15 to 18 inches long, but remained sterile. Males preponderate.

It is not stated precisely on what evidence these fishes claim hybridity, more than that they bear resemblances to both species. Indeed, from Dr. Günther's own descriptions, the Sewin characters preponderate. If, therefore, Siebold's observations, checked by Widegren's subsequent data (viz. that some individuals of every Salmonoid species are very late in being sexually developed, or have as it were a longer temporary immaturity, and during such period differ from those normally developed), be applied to this instance of hybridism, it may on such grounds be maintained that the said hybrids are after all nothing but retarded examples of *S. cambricus*.

Taken in this light, these so-called hybrids offer coincident analogies to the retarded conditions assumed to occur in *S. salar*, and notably in those two specimens which have formed the basis of the present paper.

It seems to me also a legitimate inference that the two fishes reared in our aquarium are Salmon, inasmuch as they differ in a far greater degree from all other European species than from *S. salar*. Indeed, as is broadly admitted in the British-Museum Catalogue, p. 3, of the genus *Salmo*, "The almost infinite variations of these fishes are dependent on age, sex and sexual development, food, and the properties of the water;" hence this very same reasoning which demonstrates peculiarities in the two Salmonoids and brood in question, logically points to their immaturity, retardation, or masking of the normal adult characters of the species. If their entire growth has been prejudicially influenced by continuous retention in fresh water, so may a defect or abnormal number of scales (two transversely) and pyloric appendages (three or four) be but the concomitant effect of unnatural development.

Suppose, again, our oft-quoted Garden specimens were a cross breed between any two well-known species, freshwater or marine, there remains still a wide loophole of doubt why they have remained so very small-sized. No European species whatever, to my know-

* See B. M. Cat. of Fishes, vol. vi. p. 8.

ledge, are so stunted when full-grown. Thus it follows that either lessened dimension is a result of hybridity, or the two specimens a distinct species *per se*.

In a conversation with my colleague Mr. Bartlett concerning this same question of hybridism and the size of the offspring, I received such information, based on his long experience among animals, that I think it worthy of incorporation in the present paper. From it some hints applicable to fish may be derived, or at least borne in mind, in discussing piscine forms.

His proposition is, "That among all hybrids of vertebrated animals there is a marked increase of size." In no instance coming under his observation has the offspring been smaller than both its parents. In other words, it is always larger than the lesser-sized parent; that is, supposing inequality of dimensions between the parents to exist.

Among Mammals the following examples may be cited:—

1, Hybrids between Horse and Ass; 2, the Common Zebra and Common Ass; 3, Burchell's Zebra and the Common Ass; 4, the Wild Ass (*Equus onager*) and the Zebra; 5, the Bactrian and Common Camel; 6, the Alpaca and Llama; 7, the Yak and Zebu; 8, the Barbary and Red Deer; 9, the Rhesus and Bonnet Monkey; 10, the Black-fronted and Yellow-cheeked Lemurs (*L. nigrifrons* and *L. xanthomystax*); 11, Bennett's and the Rufous Kangaroo (*Halmaturus bennettii* and *H. ruficollis*).

Among Birds:—

12. Hybrids between the Common Canary and the following, viz. the Greenfinch, the Goldfinch, the Linnet, and the Siskin.

13. Among the Galinaceous Birds, hybrids between the Common Pheasant and the Silver Pheasant, the Gold Pheasant and the Bar-tailed Pheasant; also hybrids between the Common Pheasant and the Common Fowl, the Guinea-fowl and the Black Grouse.

14. Hybrids between the Black Cock and the Wood-grouse; in this case the offspring is termed *Tetrao medius* because of the constancy of this very peculiarity as regards size.

15. Of Struthious Birds one cross only has come under Mr. Bartlett's notice, namely a hybrid between the Great-billed and the Common Rhea. Curiously enough, this offspring was larger than either of the parents.

16. Among Waterfowl a very large number might be adduced as evidence; but the subjoined may suffice:—Hybrids between the Common Goose and the Chinese species, the Canada, the White-fronted, and the Barnacle Goose (indeed cross breeds amongst various sorts of Domestic and Wild Geese have many times been observed by him); hybrids between the Common Wild Duck, the Wigeon, the Pintail, the Teal, and the Muscovy Duck. These and other instances of Waterfowl have frequently come under his notice; and in all cases the afore-mentioned law applies.

As respects fishes, authentic observations upon hybrid progeny are meagre; but I may quote some experiments made at Stormontfield.

In November and December 1857 provision was made for hatching

in separate compartments the artificially impregnated ova of:—1, Parr and Salmon; 2, Grilse and Salmon; 3, Grilse pure; 4, Salmon pure. It was found, when the young of these different matches came to be examined early (in April 1859), that the size of each kind varied a little, Mr. Buist*, Superintendent of Fisheries, informing us that:—1st, the produce of Salmon with Salmon are 4 in. in length; 2nd, Grilse with Salmon 3½ in.; 3rd, Grilse with Grilse 3½ in.; 4th, Parr with Grilse 3 in.; 5th, Smolt from large pond 5 in."

Unfortunately these experiments do not apply to the instance in point, hybridity; but they show that intercrossing between the, so to speak, imperfect form though sexually developed fish and the mature individual gives rise to diminished offspring; whereas two mature specimens produce young which, at least in their earlier stage, are of larger growth. The result, though seemingly disparaging to what Mr. Bartlett has stated of mammals and birds, is in reality not against it; for his remarks have reference to the adult hybrid and not to the juvenile condition.

Addenda.

Whilst I have freely used data tendered by friends, it is right for me frankly to state they do not concur in the sum total of my deductions; for these therefore I am alone responsible. It gives me pleasure, though, to make known some of their views, as evincing both concord and disagreement with those held by myself.

The following is a report of a statement by Mr. Buckland, which I immediately wrote out and obtained full liberty to publish.

"Salmon-ova are generally deposited from the middle of December until the middle of January.

"Young fish of the first year may be observed in the spawning-streams about May. In July and August they are as big as Minnows. The mothers risk their own lives for the safety of their progeny; they make every effort to get to places where food is abundant for their young. Some of those hatched, say, at Christmas put on the Smolt coat in the following spring; but the great majority of these young fish do not go to the sea till the spring of what may be considered their second year. They have then attained the dimensions of a Sprat.

"If a shoal of Smolts be examined whilst they are passing down, some will be seen to be only of the size of Minnows, whereas others will be quite as large as Sprats; the little ones are those of the first year's brood, the big ones of the second year's series.

"Some Smolts remain to the third year; but these differ very much from their brethren, their residence in the fresh water giving them quite a Trout-like appearance. These latter are found as long as 5 or 6 inches, and are called 'Heppers' in the west of England. They are beautiful fish, with well-developed Parr-markings, and much more common in the west of England than in the north of England. It is possible that these 'Heppers' remain in the upper

* A writer in the 'Illustrated London News,' April 19, 1862.

waters because no suitable floods occur for them to come down; and hence they are obliged to stay an extra year in fresh water. It may be that these fancy Parr-markings are a provision of nature for concealment when in the young state.

"There is good evidence of a second migration of Smolts in the month of September. This is quite a new fact; but Mr. Buckland is fully inclined to believe it, because he is of opinion that as yet *no universal law can be defined as respects migration of Salmon.*

"Nature seems to anticipate the deaths of a large number during their migratory ascent and descent, so that a Salmon river, like Jacob's ladder, has fish most months of the year, some going up and others going down. If nature sent all the Smolts of the first year into the sea in the spring of the second year, some accident might happen and all be destroyed.

"It happens instead that the crop of full-grown Salmon becomes due about the fifth year from those reared in the first year; thus a certain number are always coming into condition.

"As respects the return of Grilse, these are equivalent or *pro rata* to the descent of the Smolts. It is not at all a likely circumstance, from what is known of the return numbers, that the large quantities which as Smolts arrive in the sea in the spring of the second year will ascend in July and August of the same year. But there can be no question that they sometimes do so, if Sir William Jardine's remarks on Salmonidæ be consulted.

"Furthermore, it is a curious circumstance that in 1867 no Grilse came back from the sea throughout the entire United Kingdom. Concerning this fact a consultation was held at Mr. Buckland's rooms, and among those present were several experienced Scottish netters. The opinions expressed were very diverse, and may be arranged numerically thus:—

"1. Some held that the fish had never been hatched.

"2. Some concluded they never went down.

"3. Others believed the fish were all destroyed in the sea.

"4. Others conceived that the deficiency of return Grilse was caused by an unusual natural phenomenon unknown to man, yet wide-spread.

"5. Several parties expressed themselves that the fish would return early in the summer and autumn of 1869; and, strange to say, they did come back in enormous numbers at the time specified. Indeed the Irish fisheries in 1869 have far surpassed most of the previous seasons, and particularly in the vast preponderance of Grilse compared with Salmon. Some of the Grilse were large; but the majority were not much, if any, larger than their ordinary dimensions.

"In estimating the value of a Salmon-fishery, the calculation ought to be based upon an epoch of five years, or a *quinquennial* period. A generation of men is counted by thirty years; so in like manner a generation of Salmon ought to be estimated at five years. Some say, however, nine years; but the law of probability is rather in favour of five years.

"The term arrest of development of the Smolt, Mr. Buckland thinks, is not a scientific term. Nature has ordained that the fish should not grow more than a certain size in fresh water; that is to say, there is a maximum of growth and size in the Smolt. The transmutation of the Smolt into a Salmon takes place in the sea. Here, for the first time, we find that wonderful provision (which Mr. Buckland lays great stress on), the storing of fat on the pyloric appendages. Smolts have no fat on the pyloric appendages; but Grilse have. Non-migratory Salmonidæ have no pyloric fat; but Sea-trout possess it.

"The reason why Smolts will never become Salmon in fresh water has some relation to this development into the superior from the inferior stage of organization. This stage is not necessary for life. Salmon will live a long time in fresh water in the inferior condition, yet never pass over the line of demarcation between the two stages, unless conditions for the perfection of the secondary form be present. This is shown in the fact that nature actually orders a new coat for the creature when it passes from the one condition of things to the other.

"If the migratory instinct is impeded by human intervention, the dress assumed at such times disappears, and the fish (by a happy provision of Providence) continues to wear its Parr-coat, which, as the fish gets bigger, becomes increased in intensity. The 'Heppers' already spoken of exemplify this.

"The arrest of development is a term, therefore, which can only strictly be applied to Salmon in the sea, inasmuch as the arrest is simply the first natural stage of the progressive series of growths. Such stages of Salmon-growth have a parallel in the changes of insect-form: thus egg =ovum, caterpillar =parr, chrysalis =Smolt, and the butterfly =Salmon, may be said to be the analogous stages whereby insect and Salmon pass from the imperfect to the perfect condition."

Among what I have classed as addenda comes, as undernoted, a Table of dimensions (B). In the first notice (P. Z. S. 1868, p. 253) I was only able to give in detail those of specimen No. 1; but No. 2 has died since, and thus permitted its linear measurements to be taken. I have placed alongside these five other specimens, four of which are nearly similar in length, and the other that of a full-grown fish. These are specimens described individually by Dr. Günther in his Catalogue, and have been chosen by me to illustrate the proportional sizes and relations of the parts of the body to each other in an immature Salmon, a Sewin, a quasi-hybrid, a *S. nigripinnis*, and a fully developed *S. salar*. As the fractions used in the Catalogue are chiefly given in fourths, eighths, and sixteenths of an inch, I have converted these into decimals, enabling comparison between my two specimens and them more readily to be drawn therefrom.

Columns I. and II. relate to the Society's specimens, described in the previous paper.

Column III. relates to a young male Salmon (Parr), from the

Kulder (a rocky mountain-stream joining the river Tyne, in Northumberland), with the testicles fully developed.

Column IV. to a Sewin, or Bull Trout (*S. cambricus*) from the Rhymney. A male in the Smolt state, before going down the sea.

Column V. gives the admeasurements of one of the so-called hybrids between the Sewin (*S. cambricus*) and the River-trout (*S. fario*). "A young female from the Towey, caught in the month of August."

Column VI. gives those of a male specimen of the *S. nigripinnis*, with testicles well developed. "From Llyn Gadr, caught in the month of August."

Column VII. gives those of a perfect-conditioned male Salmon from the river Tweed.

TABLE B.

	I. Zool. Soc. spec. No. 1, Proc. 1868.	II. Zool. Soc. spec. No. 2, Proc. 1868.	III. Salmon-parr, B. M. Cat. p. 21.	IV. Sewin, Smolt, B. M. Cat. p. 45.	V. Hybrid? B. M. Cat. p. 57.	VI. *S. nigripinnis*, B. M. Cat. p. 99.	VII. *S. salar*, ad., B. M. Cat. p. 16.
	in.	in.	in.	in.	in.	in.	in.
Total length	6·5	7·6	6·5	6·87	7·50	8·00	46·0
Greatest depth of body	...	1·2	1·43	1·37	1·50	1·62	11·50
Length of the head	1·4	1·2	1·37	1·43	1·56	1·75	10·50
Least depth of tail	...	0·6	0·56	0·56	0·62	0·75	3·33
Distance from end of snout to eye	0·3	0·45	0·37	0·37	0·37	0·37	4·50
Length of maxillary bone	0·6	0·75	0·43	0·56	0·62	0·75	3·75
Distance between eye and præopercular angle	...	0·5	0·37	0·50	0·50	0·62	3·33
Greatest width of operculum	...	0·4	0·37	0·37	0·37	0·37	2·12
Greatest depth of operculum	...	0·75	0·43	0·50	0·50	0·56	3·0
Distance between occiput and origin of dorsal fin	...	1·75	1·62	1·87	1·75	1·87	14·0
Distance between end of dorsal and root of caudal fin	...	2·40	2·06	2·31	2·5	2·87	15·0
Length, base of dorsal	0·9	0·85	0·75	0·75	0·75	0·87	4·66
Greatest height of dorsal	1·2	...	0·87	0·81	1·00	1·12	4·50
Length of pectoral	1·2	1·3	1·25	1·00	1·25	1·37	5·50
Distance between roots of pectoral and ventral	1·6	1·8	1·62	1·87	2·00	2·00	12·5
Length of ventral fin	...	0·9	0·87	0·75	0·87	1·12	4·66
Distance between root of ventral and origin of anal	1·2	1·15	1·0	1·00	1·37	1·37	10·5
Length of the anal	0·8	0·8	0·56	0·43	0·56	0·62	3·33
Length of longest caudal ray	...	1·1	1·06	0·87	1·12	1·25	6·00
Length of middle caudal ray	...	0·55	0·43	0·56	0·56	0·62	...

Between the Society's two specimens there is a close agreement, the head of No. 1, however, being proportionally and absolutely the longest. The Parr (III.) corresponds to both, the main disagree-

ment being in the less depth of the operculum, and smaller size of the dorsal and anal fins.

The Sewin, excepting in a smaller ventral fin, is almost intermediate between the three foregoing. The hybrid (?) varies in proportional dimensions little from the preceding; the head may be considered a trifle longer than in them, as also the distance betwixt the dorsal and caudal fins, betwixt the pectoral and ventral fins, and betwixt the ventral and anal. Considering that the specimen of *S. nigripinnis* is a shade larger fish, its admeasurements wonderfully harmonize with the five already mentioned.

What, therefore, appears to be elicited is that, *pari passu*, the fishes No. 1 and No. 2, fully four and five years old respectively, are almost identical in the relative proportions of their bodies with what may be assumed much younger Parr, Sewin Smolt, hybrid Sewin, and the so-called *S. nigripinnis*.

Taking column VII. into consideration, and contrasting it with III., the relative growths of the several parts of the Salmon's body to each other (from the Parr to the adult condition) are proved to be unequal in ratio. The total lengthening of the body, in the instances cited, is =7 times. The depth of the body increases ×8. The head elongates ×7·6. The least depth of the tail has an increment =×5·9. The distance from the end of the snout to the eye enlarges ×12·1 times, or in the male the anterior segment of the face is proportionally excessively developed, a fact not at variance with the proportion between adult male and female Salmon. The maxillary bone grows in length ×8·7. The distance between the eye and the opercular angle increases nine times from the Parr to the adult stage as a Salmon. The operculum widens ×5·7, and its depth becomes =×7. Betwixt the occiput and the dorsal fin the intervening space lengthens by ×8·7, and that betwixt the dorsal and caudal fin 7·2 times. The elongation basally of the dorsal fin is =×6·2, and its height =×5·1. The pectoral fin lengthens ×4·4; but the increase of distance between the roots of the pectoral and ventral fins is =×7·7. The elongation of the ventral fin proceeds to ×5·3 times, whereas the distance between the root of the ventral and the origin of the anal fin becomes =×10·5. The anal fin grows 5·9 times as long, the longest caudal ray ×5·6.

The above data are of course only approximate, as from the comparison of only two specimens it would be unfair to draw conclusive deductions; but, taken for what they are worth, computation gives the following general results:—

1. The average measurements of the development of the body, head, occiput to dorsal fin, dorsal to caudal, and pectoral to ventral fins are as 7·44 to 1.

The amount of divergence between the ventral and anal fins, 10·5 to 1, is much greater than the foregoing maximum and minimum, an anomaly possibly dependent on sex.

2. The ratio of increase of the maxillary and the eye to that of the operculum averages 8·85 to 1.

3. The average elongation of the fins is as 5·26 to 1.

4. The depth of the body and root of tail differ as regards augmentation, the former being as 8 to 1, the latter as 5·9 to 1.

5. Between the width and depth of the operculum, respectively 5·7 and 7 to 1, the horizontal to vertical increase is inversely to what obtains in the body.

Availing one's self of these considerations, and comparing specimens I. and II. with III. (Table B), it will be seen, more especially in the older fish, II., that the maxillary bone and distance from snout to eye are proportionally larger than in the Parr. The same may be said as regards growth of the operculum, more particularly its depth. The distance between the ventral and anal fins is also sensibly greater. Thus those parts which in the adult, *cæteris paribus*, show the greatest relative accretion are, curiously enough, in the Salmonoids reared in fresh water, the parts which have most increment. From this it follows that whilst a general arrest of development, retardation of growth, or whatsoever the term used, has occurred from the altered physical circumstances, still the proportional magnitude of the parts has kept pace with that of a normally developed adult Salmon favoured by visits to the sea.

General Conclusions.

The main fact at issue—Can *Salmo salar* live for series of years in fresh water without access to the sea?—if not settled beyond cavil, has, I venture to think, in this and the preceding paper, been tolerably well substantiated. At least the evidence of many observers has been given; so that it remains for those who discountenance the view to show the fallacy of the data, and prove on evidence as reliable that the contrary is the true state of the case. This does not interfere with the necessity of further experiments being tried. For my own part, I am quite willing to bow acknowledgment to whichever side the truth lies on—though, after an impartial consideration, I cannot escape or reason away the strong presumptive allegations positively confirming the opinion. To me they are reasonable, because based on what, in homely parlance, are deemed everyday occurrences. The principle in the life-history of the Salmon which seems at variance with its customary habits is in reality not so; what takes place as a general rule is here but temporarily departed from. In the physical constitution of animals, the limits assigned to the well-being of the individual are not so rigidly exact as a mathematical problem; hence, to judge rightly, we must know all, or be prepared to confute abnormal phases of existence. In the present instance the choice of credence lies between testimony harmonious with laws regulating the primary growth of Salmon, and suppositions framed on circumstances we have but an imperfect knowledge of, unless it be satisfactorily shown that the statements of such a truthful observer as Yarrell, or the instance recorded by Anderson, are fictitious or egregiously false.

Those who deny that some Salmon, few or many, can permanently accommodate themselves to a freshwater residence for a comparatively

long period, seem to have lost sight of the value of several important points and consequent deductions.

1. That, in the natural condition, Salmon-fry do not all attain vigorous adolescence at the same period; still more so is their irregularity as regards perfect maturity.

2. That the periodical accession of the migratory impulse does not affect all alike, either as to time or season.

3. That those which do remain behind in the rivers for two seasons or more grow, relatively speaking, no larger than their juniors in age.

4. That the very fact of their abnormal retarded growth may account for several peculiarities as to organization, which divergence from the type has been put down to specific difference or hybridity.

5. That the admission of the uncertainty of the species (reared in the Gardens) strengthens the presumption of their being *S. salar*, when it has been demonstrated that their characteristic affinities are closer to that than to any other form.

6. That the belief in the hybridity of Salmonoids under natural conditions is, as yet, based on data less stable than the assertion that Salmon can abide long in fresh water: hence such an argument presents feeble opposition.

7. That not only does an occasional lengthened stay in fresh water accord with known habits, but, inversely, a more than ordinary protracted stay in sea-water occurs at times. In the instance mentioned (*anteà*, p. 42), the majority of the return Grilse had grown no larger than those sojourning only a few months in the salt-water. This circumstance tells weightily in support of a temporary cessation of growth happening equally when Salmon dwell longer than the normal period either in the river or the sea.

8. That the fact of Salmon periodically tenanting sea and stream does not absolutely enforce migration under immediate penalty of death. The bodily improvement consequent on the change, however, is tantamount to its being needful to their ample development; *ergo*, causes checking the migratory impulse are coincident with the abeyance of growth.

9. That marine fish, other than migratory Salmonoids, have survived freshwater confinement.

10. That numerous instances can be adduced showing that fish of several sorts remain relatively feeble or thrive vigorously, according to limited space and nourishing food being withheld or granted to them. Salmon offer no exception.

11. That in well-attested cases fish confined to tanks are predisposed to variability—this notably in the Cyprinidæ, which present no very distant family relationship to the Salmonidæ, whence it may be assumed that such phenomena in the latter would be likely to supervene.

12. That in animals which exhibit peculiar phases of transformation or rapid changes at epochs of their life, exemplified in some Echinodermata and Insecta among invertebrates, and certain Batrachia* among vertebrates, physical agents play an important part in

* *Vide* Higginbottom's experiments (Phil. Trans. 1850, p. 434, pl. 32).

the retardation or hastening of development. So, therefore, temporary arrest of growth in Salmonoids is but an expression of the same law; and it is worthy of special note that Salmon-ova preserved in ice are hatched later than when placed in a more suitable temperature.

13. That the proportional growth of head to body &c. of Salmonoids confined in fresh waters bears a diminished, though steady, ratio to that between Parr and adult Salmon. Thus it would seem that the same disposition as to the growth of parts is manifest, but antagonized or hampered by the unnatural conditions extant.

14. That solid evidence is published of sexually mature male SalmonParr being frequently met with in natural conditions. Experimentally, milt from such has impregnated Grilse-ova, the brood resulting showing diminution of early growth compared with Salmon-milt and ova, Grilse with Salmon, and Grilse with Grilse. It may be conjectured, therefore, that the produce of the former parents would be much more likely to evince variation as regards development and migratory instinct than would fry derived from full-formed fish.

15. That such legitimate though unequal unions should peradventure happen, may very plausibly be assumed to be the case, rather than that hybridism between specifically different forms, spawning at separate dates, does often ensue.

The above fifteen points, even when sifted and divested of extraneous remarks and unguarded assertions, still form a compendium which materially urges the following convictions:—(α) That though as a rule Salmon necessarily spend periods of their life in sea-water, circumstances may conduce to this being postponed temporarily or indefinitely. (β) That a very appreciable arrest of growth is the consequence where retention to a limited area of water obtains.

I leave it as an open question, whether *S. salar* may not vigorously grow and multiply in extensive lakes and running streams, though, I may add, the preceding convictions prepare the mind for that belief.

Respecting the term "arrest of development," which my friend Mr. Buckland holds can only significantly be applied to a Sea-salmon, and in itself is not scientific, I entirely disagree with him. I grant the phrase is one seldom if ever used by ichthyologists or in practical natural history; but in pathological anatomy, and the kindred subject of malformations or teratology, it is of great import. The celebrated Russian embryologist Wolff suggested the term, and the no less famous comparative anatomist J. F. Meckel followed, and first used the expression (*Bildungshemmung*) commonly adopted by succeeding writers on malformations—a sufficient guarantee for its scientific accuracy.

The dwarf formation, abnormal diminutiveness, or retardation of growth that affects the Salmon in question is essentially due to a congenital or acquired arrest in the growth or development of the organs or system generally. Growth may be checked either in the embryo condition or subsequently to birth; and the latter appears to be the case with the fish under immediate consideration. That is

to say, after the fry have reached a certain grade of maturity and bulk, causes (nature of food and retention in a limited volume of fresh water) induce malnutrition or derangement of nutrition, hindering normal growth. Had the Salmonoids gone to the sea and returned stunted, the term "arrest" would still be partially applicable, inasmuch as normal evolution from the embryonic to the full-formed animal would have been interfered with, or remained stationary short of completion. The phrase would be equally a happy one, viewing the development of Salmon as a series of stages of progressive growth, as Mr. Buckland puts it; for as some physiologists limit "growth" solely to increase of size, and "development" to structural change*, the idea of progressive advance in the Salmon would sanction the "arrest of development" as a most suitable term.

Should future researches support the facts and views it has herein been endeavoured to establish, obviously many species at present adopted in the nomenclature of the genus *Salmo* may require material modification. For doubtless it would follow that the same fish, under different grades and shades of development, has been distinctly and separately named, as, indeed, H. Widegren† has already attempted to show, and has partly been supported and opposed by Malmgren‡ and Günther. The geographical distribution of the group as now understood might need revision. It would likewise strike at the root of living transitionary species, and be the clue whereby a path through the labyrinthine variations of the Salmonidæ would lead to a better knowledge and study of the group. Assumed hybridity of Salmonoids must necessarily require a much broader body of evidence, and more vigorous scrutiny of data, than has hitherto been accorded it. Although it may be said that fish-spawn presents far greater accessibility to the fecundating influence of the milt of a different species than does the union of the germinal products of higher Vertebrata, still the line of demarcation must rest sharply somewhere; otherwise no such thing as specific identity would be recognizable in the produce; instead of hybrids being rare, or in the minority, as now obtains, they would soon be in overwhelming majority, and reduce the present faint distinctions of the Salmonidæ to a chaos.

On the other hand, can it be that in this variability from a common stock we have tracings of the elimination of natural species? Has the inherent organization, permitting some individuals to survive changed conditions, alone the utility of preserving the race, or does it carry with it the elements of structural variety, whereby ultimate scission from the primary type is effected?

There are not wanting able defenders of views of an entirely opposite character; but in whatever direction the opinion leads, the force

* See some pertinent remarks thereon in Darwin's 'Animals and Plants under Domestication,' vol. ii. p. 389.

† Öfvers. Vetensk. Akad. Förhandl. 1863.

‡ Kritisk Öfversigt af Finlands Fisk-Fauna: Helsingsfors, 1863. Translated, Wiegm. Archiv, 1864, and reviewed, Record of Zool. Lit. 1864, p. 178, by Günther.

of Professor Agassiz's * expressions (himself adverse to the transmutation theory) cannot be denied. In treating of the relations between animals and plants and the surrounding world, he says, "And yet, without a thorough knowledge of the habits of animals, it will never be possible to ascertain with any degree of precision the true limits of all those species which descriptive zoologists have of late admitted with so much confidence into their works. And, after all, what does it matter to science that thousands of species, more or less, should be described and entered into our systems if we know nothing about them!" . . . "Then we may learn with more precision how far the species described from isolated specimens are founded in nature, or how far they are only a particular stage of growth of other species; then we shall know, what is yet too little noticed, how extensive the range of variation is among animals observed in their wild state, or rather, how much individuality there is in each and all living beings."

No decided answer can be given to the questions at issue while so much of the commoner facts in the life-history of the Salmonidæ are conjectural. Every scrap of information based on accurate observations is needed to unravel the phenomena, whether dependent on reasons physiological or physical, teleological or pangenetical.

EXPLANATION OF PLATE II.

Illustrations of the variable growth of Salmonoids in tanks of fresh water.

Fig. 1. Young of the Great-Lake Trout (*Salmo lacustris*?), being one among others reared from a batch of ova from Huningue, near Basle, and presented to the Society by Mr. Frank Buckland, 9th or 10th March, 1869. The specimen was nine months old, having been hatched about the middle of March; and the drawing was taken immediately after death, on the 15th December, 1869, natural size, *i. e.* 3·3 inches long. A few of the same brood were somewhat larger, others smaller.

Fig. 2. A young Salmon (?) from Rhine ova, received as above. Length 1·95 inch; natural dimensions: sketched 14th December, 1869.

Fig. 3. Another specimen of the same batch of Salmon (?), and corresponding to fig. 2 in age, viz. about 9 months. Natural size, =2·7 inches, and, as in fig. 1, figured immediately after death.

The brackets, respectively lettered *a*, *b*, between the preceding figures, indicate the length (3·1 inches) of one of nine good-sized specimens of the same brood of Salmon (?), which died on the 6th October, or somewhere betwixt 6 and 7 months old. Had they lived until the middle of December, doubtless they would have grown as large as the Great-Lake Trout here represented.

Fig. 4. Salmon (?) from Rhine ova, fully 2 years old, which, like the above, was reared and retained in the Society's freshwater aquarium at the Regent's Park. Hatched February 1866, died 14th April, 1868.

The figure, natural size and colour, taken immediately after death, shows the assumption of the silvery Smolt-coat, indicative of the migratory impulse.

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* An Essay on Classification (London, 1859), pp. 85, 86.

January 27, 1870.

Professor Newton, V.P., in the Chair.

Mr. Sclater read extracts from several letters addressed to him by Mr. Robert B. White, C.M.Z.S., concerning the Hairy Tapir (*Tapirus roulini**), specimens of which Mr. White was endeavouring to procure for the Society's Menagerie. In a letter dated Popayan, 8th June, 1869, Mr. White wrote as follows:—

"During the past two months I have been several times on the central Cordillera, to the Volcano of Puracé and elsewhere, and have thought that it would be highly interesting to the Society to get specimens of the Tapir which is found there. Boussingault speaks of it, I think; but owing to the stupidity of the natives, the tales told about the animal are so absurd as to throw discredit on its existence. They are very shy, and I have not been able to get near them, but have seen them at a distance of half a mile, with a telescope, bathing themselves in a small lake. I have also seen the footprints, the excrement, and the skins occasionally brought in by the Indians. From this I can say that this Tapir is about the size of the ordinary one, greyish black, with very powerful snout and hoofs. It is never found at a lower elevation than 3500 metres above the sea-level, where the temperature is 6° to 10° Cent., and it exists up to 4200 metres. It would therefore be easy to acclimatize it in England; for it constantly freezes in the Cordillera at 4000 metres. These animals are rarely killed, because the skin only sells for about 3*s*.; but last week I bought a Bear's skin from an Indian, who sometimes kills Tapirs."

Mr. Sclater remarked that this Tapir was a very rare animal, and that he believed that there was no complete specimen of it in any European collection†. It appeared to have been first discovered, about 1828, by Dr. Roulin, during his residence at Bogota‡, on the Paramos of Quindiu and Suma Paz. A second French naturalist, M. Justin Goudot, who was in New Granada about 1842, had given us some particulars concerning the life and habits of this Tapir in a memoir published in the 'Comptes Rendus' of the Academy of Sciences of Paris (vol. xvi. p. 331, 1843). M. Goudot met with the animal at an elevation of from 1400 metres to 4400 metres (being nearly up to the snow-level) on the Peak of Tolimá.

The only other original authority that mentioned this animal was

* The first *Latin* specific name applied to this Tapir appears to be *roulini* of Fischer (Syn. Mamm. Add. p. 406), 1829. Wagler's term *villosus* (Syst. d. Amph. p. 17) is one year later; and the earlier French writers merely call the animal *Tapir pinchaque*.

† [In reply to inquiries, M. Alphonse Milne-Edwards kindly informs me that the collection of the Jardin des Plantes includes only two crania of this Tapir—one obtained by M. Roulin in 1828, and the other by M. Goudot in 1843.—P. L. S.]

‡ See Cuvier's report on M. Roulin's memoir (Ann. Sci. Nat. xvii. p. 107), and M. Roulin's memoir itself (Ann. Sci. Nat. xviii. p. 26).

Tschudi, who, however, gave its occurrence in Peru (Faun. Peruan. Mamm. p. 213) from hearsay, not having himself observed it. According to the native reports, it was found in Peru, on the eastern slope of the minor Cordilleras, at an elevation of from 7000 to 8000 feet above the sea-level.

Mr. Sclater remarked that the acquisition of a living specimen of this animal would be of great interest to science, and announced that the Council had already placed a sum of money at the disposal of Mr. White for the purpose of making preliminary investigations.

In laying before the Meeting a skin of the North-American *Zonotrichia albicollis*, which had been shot near Aberdeen on the 17th of August 1867*, and sent for exhibition by Mr. W. C. Angus of that town, Professor Newton called attention to the practice of many, or most, ornithologists in this country, who are prone to give the name of "British birds" to all such species as occur from time to time in the United Kingdom. This practice he deemed to be very injudicious, as it tended to confound every correct notion as to the geographical distribution of species—one of the most important subjects with which naturalists had to deal. Without venturing at present to draw a positive line of demarcation, he thought that at any rate those species of birds which confessedly do not breed within the limits of the zoogeographical region in which the British islands lie should on no account be termed "British," and that it should be a matter for future deliberation how far the same title might properly be given even to species which certainly do breed within the same limits. Speaking accurately, the term "British" should be restricted to those species of birds which for a longer or shorter period of the year actually *inhabit* the British islands. But Prof. Newton was inclined to think that this rule might be relaxed in the case of certain European or even North-Asiatic species which, though apparently only chance stragglers, might reasonably be regarded, in the absence of more complete observations, as occurring much oftener without attracting attention; and added that it was quite possible that some of these, which had been noticed the most frequently, were in fact regular annual visitors to this country.

Dr. Cobbold, F.R.S., exhibited specimens of, and made remarks upon, the new Entozoon from the Aard-wolf, described at the last Meeting of the Society, and proposed to be called *Acanthocheilonema dracunculoides* (vide *antea*, p. 9).

Mr. G. Dawson Rowley, F.Z.S., exhibited, and made the following remarks upon, a specimen of the Siberian Lark (*Alauda sibirica*, Gmelin) and other rare British birds:—

"I have the pleasure to exhibit to the Society a specimen of the

* *Vide* Proceedings of the Natural-History Society of Glasgow, vol. i. part 1, p. 209, plate.

Siberian Lark (*Alauda sibirica*, Gmelin; the *Alauda leucoptera* of Pallas). It was caught near Brighton, November 22, 1869, out of a flock of about two dozen of *Emberiza nivalis*, and is a female. This is, as far as I know, the first of this species ever captured in Great Britain.

"I also place before the Meeting a Wild Canary (*Fringilla canariensis*), taken in a clap-net November 20, 1869. How such a bird arrived in this country I cannot say.

"The third bird which I have to show is a Lapland Bunting (*Emberiza calcarata*).

"These three birds are recorded in the January number of the 'Zoologist' this year as *Fringilla nivalis*, *Emberiza rustica*, and *Fringilla citrinella*. With the aid of Professor Newton, when we saw the Lark on the 1st of January, I assigned to it its true designation. Various Northern species have lately occurred at Brighton, in addition to *Alauda sibirica*, such as *Emberiza pusilla*, *Emberiza rustica*, *Turdus atrigularis*, and *Pyrrhula erythrina*, all of them of considerable interest."

The following papers were read:—

1. Letter on the Discovery of Cooking-pits and Kitchen-middens in Canterbury Settlement, Middle Island, New Zealand. By Dr. JULIUS HAAST, F.R.S. Communicated, with Remarks, by Prof. OWEN, F.R.S., F.Z.S., &c.

As most of the information on record respecting *Dinornis* is to be found in the publications of the Zoological Society of London, I use the liberty given me by my esteemed correspondent Dr. Haast, F.R.S., to submit to the same Society the accompanying letter of October 20th, 1869, received January 8th, 1870:—

"Canterbury Museum,
Christchurch, N. Z.,
October 26, 1869.

"MY DEAR PROFESSOR OWEN,—I have to thank you very much for your kindness in sending me Parts XI. and XII. of your Memoirs on *Dinornis*, which I received by last mail, and which I have read with great interest. Concerning the age of remains of the *Dinornis robustus*, described in the first, I have not visited the locality where they were found, but am certain that they must have been buried in very dry sand, because I have no doubt that the species of *Dinornis* have been extinct many hundreds of years—an opinion which I formed some years ago from the manner of their occurrence, as well as from the fact that the Maories, the present inhabitants of New Zealand, have no traditions about them. Some time ago I sent a paper on some prehistoric remains of New Zealand to Sir Charles Lyell, in which I have treated of the subject. Since then I have been so fortunate as to find a large Moa-hunters' encampment, with

their cooking-places and kitchen-middens, covering more than forty acres, near the mouth of the River Kakaia, where I have made extensive excavations. The results, which I shall publish as soon as some other work which I have in hand will allow me, will be considered not uninteresting, as they give us not only an insight into the habits of a primitive people who hunted (and, I may say, exterminated) the *Dinornis*, but have also brought to light their rough stone implements. These are either pieces of hard sandstone broken off from large boulders in a peculiar manner, or made of flint or, rather, hard siliceous rocks, chipped very roughly, and generally the exact counterpart of those found at Amiens. Some of them are, however, chipped only on one side, the other side being perfectly flat. I have drawings made for publication of some of the most characteristic ones. The cooking-places or ovens are built like those of the Maories, and are now covered by from 6 to 8 inches of silt and vegetable soil.

"But what is still more striking is the state in which the Moa bones are found. I collected from some of the kitchen-middens all the bones, and brought them to Christchurch to sort them; and the result was a very interesting one; in every respect it coincided with that obtained by the excavations at Glenmark. If you will look at the list in the 'Transactions of the New-Zealand Institute' (vol. i. p. 89), you will observe that by far the greater number of bones belonged to *D. casuarinus* (45), the next to *D. didiformis* (37), and then to *D. crassus* (14). The same proportional occurrence is also found in the case of the kitchen-middens—*D. casuarinus* predominating, and *D. didiformis* and *D. crassus* following in numbers. There are also some bones of *D. elephantopus* (13) and of a small *Palapteryx ingens* (belonging to several specimens), but none of *D. giganteus* and *D. robustus*.

"The leg-bones are all broken, the tibiæ on both sides near the end, so as to get out the marrow or the contents of the hollow of the bone. At the same time both ends are generally scooped out, so as to suggest at once that the Moa-hunters used a flint flake as a spoon to get the animal eatable matter out of those parts of the bone which were more difficult to break. The middle portion of the tibiæ is nearly always broken into small fragments; and I found near the kitchen-middens several large flat stones and also others of an oblong form, which had doubtless been used for the purpose of smashing them. Femora and metatarsi of specimens belonging to *D. casuarinus* and *D. didiformis* are partly broken in the centre, partly on both sides; but those of *D. crassus* and *D. elephantopus*, owing to their pachydermal form and the narrow hollow inside, are generally only broken in the centre, and in many cases are still intact, as not offering sufficient inducement for taking the trouble. The skulls are invariably scooped out from below to get at the brain. The pelvic and sternal bones are always in fragments.

"There were also bones of the native Dog, of Seals, Sea-gulls, and the tympanic bones of several species of Whales amongst them,

but no *human* bones; so that it seems certain that the inhabitants of these islands who hunted the Moa were not cannibals. There were, with the exception of sharp flakes of flint and obsidian, no stone implements which could have been used as weapons for warfare or chase; and I suppose, therefore, that these people manufactured wooden ones for such purposes, and that they caught the birds in pits or snares. I found also some pieces of translucent quartz, rock-crystal, chalcedony, agate, and cornelians, but not the least sign of greenstone or nephrite. It is therefore evident, although the Moa-hunter obtained flint from different and distant parts of this island, and obsidian from the northern island, that the use of the nephrite was not known, and that they had never visited the west coast.

"Another proof of the primitive character of this people may be adduced from the total absence of ornaments of any kind made of a substance of permanent character. There were, however, two ulnæ of the Albatros, broken in the centre, which had both been neatly bored near the proximal end, and consequently might have been used as amulets or for ornament; but I hope that further researches will give us a still greater insight into the life of this remarkable prehistoric people. I shall not fail to send more specimens from these kitchen-middens to England, so that you may be able to examine them; and I trust that this preliminary communication will not be without interest to you. Should you consider these notes of sufficient importance to lay before the Geological or any other Society, I shall be very glad if you would do so.

"I am expecting very anxiously the result of your examination of the bones sent to Mr. Flower, of which doubtless the British Museum has kept those which were wanted for the completion of the collection.

"Your twelfth Memoir, containing the description of bones of *D. maximus*, was particularly useful to me, because I observed that my No. 18 is not only your *D. maximus*, but that the three leg-bones of Major Michael belong to the identical specimen of which we have the pelvis, right femur, tibia and fibula, and the two first dorsal vertebræ in our Museum. It is thus evident why we could not succeed in finding the other bones, since they had been taken out of the drain, as I expected all along. I should like very much to obtain a cast of the tibia and metatarsus of your *D. maximus* to complete our leg; and if you like, I will send you a cast of the fibula. The fragment of metatarsus found in the drain belonged, as I suspected, to the same specimen. I thought and hoped that the bones you had described as of *D. maximus* belonged to a specimen of which we possess some phalanges and a few vertebræ, and of which the leg-bones disappeared mysteriously from Glenmark. The men in excavating the drain got three leg-bones out, which they considered to have been 7 feet to 7 feet 6 inches together in length. Mr. Moore inspected them, and confirmed this statement. The men placed the bones carefully in the grass; but when they returned after dinner to work, the bones were gone. I hope they will turn up some time. Should you like a drawing, with dimensions, of the pelvis,

which is in perfect condition, please to tell me, and I shall have it prepared as soon as possible.

"Believe me, my dear Professor Owen,

"Your's most faithfully,

"*Prof. R. Owen, F.R.S.,* "JULIUS HAAST."
British Museum, London."

In perusing with much interest the foregoing letter, I jotted down a few notes that occurred to me, and send the following as an Appendix to Dr. Haast's remarks:—

In the traditions of the Maories, handed down by tales and chaunts from father to son, collected and translated by Governor Sir George Grey, K.C.B., are some relating obviously to the Moa*. Through how many generations such traditions had travelled there is no evidence. Neither does Dr. Haast communicate in the foregoing interesting letter the other alleged facts on which conviction could rest as to the indubitableness of the extinction of the species of *Dinornis* "many hundred years ago." If the "manner of their occurrence" relates to the depth "6 or 8 inches of vegetable soil" covering the "cooking-places or ovens," that evidence is insufficient as to their date.

The native oven and contiguous heap of bones discovered by Mr. Cormack in the North Island of New Zealand, in the bay Opito, on the east coast, were covered by a "stratum of sand" of 3 feet depth†. The "kitchen-midden" there was chiefly of remains of *Dinornis*, with bones of smaller birds and of fishes; and, with reference to the former, it is significant of a knowledge of the "traditions," that Mr. Cormack's "native attendant remarked that they were the remains of the food cooked here at a former period and eaten by the then native inhabitants"‡.

The geological judgment, to which Mr. Cormack defers, as to the time required for the accumulation of 3 feet of drift-sand over a cooking-oven on a sand-cliff by the sea-shore would not be favourable to assigning to it a date of "several hundred years." Mr. Cormack does not notice any human remains or works in his "kitchen-midden;" nor were any of the former in the collection of bones transmitted to me. Dr. Haast's negative evidence is the more valuable, since remains of the human skeleton were evidently sought for, and would have been recognized by so accomplished a naturalist and anatomist. I conclude, therefore, whatever may be the date of these Moa feasts, that the moderate or middle-sized species of these large birds were then in numbers sufficient to stave off that fell famine which at or near the epoch of their extinction drove the Maories to cannibalism. But upon this point, and in the absence of the more gigantic species of *Dinornis* from the "ovens" and "middens" discovered by Dr. Haast, I may refer to the concluding paragraph of my first memoir "on *Dinornis*" (Trans. Zool. Soc. vol. iii. p. 270).

* See Sir George Grey's remarks, below, p. 116.—ED.
† "On *Dinornis*," Part VI. (Trans. Zool. Soc. vol. iv. p. 146).
‡ Ib. p. 146.



J. Smit. del.

M. & N. Hanhart imp.

CORYPHISTERA ALAUDINA.

I will only add that the cranium of the *Dinornis*, tom. cit. pl. 38. fig. 41, that figured in vol. iv. pl. 24. fig. 4, and a few other mutilated crania not figured show the basal aperture which Dr. Haast rightly, I believe, conjectures to have been made for the purpose of extracting the brain.

2. On some new or little-known Birds from the Rio Paraná. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

(Plate III.)

The authorities of the Smithsonian Institution have kindly submitted to my examination a small collection of bird-skins from various parts of South America, belonging principally to the difficult groups of Tyrannidæ, Dendrocolaptidæ, and others, which it is almost impossible to determine without the assistance of a large series of named specimens. Amongst these are several skins obtained during the second American expedition to the Rio Paraná, under the command of Capt. T. J. Page, U.S.N., in 1859–60. Some of these belong to very interesting species, such as *Casiornis rubra* (Vieill.), *Hapalocercus pectoralis* (Vieill.)*, *Stigmatura budytoides* (Lafr. et d'Orb.)†, *Euscarthmus margaritaceiventris* (Lafr. et d'Orb.), and *Empidagra suiriri* (Vieill.). Two others, which have particularly attracted my attention, are a specimen of the scarce Synallaxine form *Coryphistera alaudina* of Burmeister and a rather obscure Tyrant-bird, which I propose to describe as new.

The single skin of *Coryphistera alaudina* (Plate III.) is the only example that I have ever seen of this bird besides the original specimens of Burmeister, which were obtained in the neighbourhood of the city of Paraná. It is marked "Vermejo, Feb. 1860," by which, I suppose, is intended the Rio Vermejo—a confluent of the Paraguay above its junction with the Paraná. It agrees generally with Burmeister's description (La Plata-Reise, ii. p. 470), and belongs, without doubt, to a well-marked and rather isolated form, to be located, as Burmeister has arranged it, near to *Synallaxis* and *Anumbius*, but presenting some points of analogical resemblance to the Crested Larks. Burmeister does not notice the white lores and eye-ring and the chestnut ear-coverts, which form a conspicuous feature in this bird; but his description is otherwise generally accurate.

Of the Tyrant-bird above alluded to, there is likewise only a single skin, labelled "male: Corumba, Brazil, July 1859"‡. Its colour

* *Cf.* Pelzeln, Orn. Bras. p. 103.

† *Cf.* Sclat. et Salv. P. Z. S. 1866, p. 188.

‡ Corumba is a Brazilian settlement on the Upper Paraguay in the province of Matto-Grosso, about 120 miles above Coimbra. See Page's 'La Plata, the Argentine Confederation, and Paraguay' (New York, 1859), p. 187.

somewhat reminds one of *Sayornis*; but it appears to belong structurally to *Cnipolegus*, and I propose to call it

CNIPOLEGUS CINEREUS, sp. nov.

Obscure cineraceus fere unicolor, tectricum alarum et secundariorum marginibus angustis paulo dilutioribus; fronte, oculorum ambitu, et cauda tota nigricantibus; remigum externorum apicibus angustatis, acutis, eorum omnium pogoniis internis in parte basali et maculis quibusdam hypochondriorum absconditis albis: rostro nitenti-corneo, pedibus obscure carneis: long. tota 5·3 *poll. Angl., alæ* 2·3, *caudæ* 2·5, *tarsi* 0·75.

Hab. Corumba, in ripis fl. Paraguay superioris.

Mus. Smithsoniano, no. 16,355.



Cnipolegus cinereus.

This bird agrees in every essential part of its structure with the smaller species of *Cnipolegus* forming the section *Sericoptila*, but may be distinguished at once by its nearly uniform dark cinereous colouring, with paler brownish edgings to the wing-coverts and secondaries. The bill is like that of *Cnipolegus unicolor*, differing only in being slightly narrower. As in the last-named species, also, the outermost primaries are very narrow throughout their length and pointed at their extremities. The fourth primary is longest, slightly exceeding the fifth, the outer three being graduated.

The tail is nearly square, the outer rectrices being but little shorter than the median. The feet are those of the other *Cnipolegi*, but perhaps rather more slender.

3. Description of a new Genus and Species of Shells from Whydah, on the West Coast of Africa, with some Remarks on the Genus *Proto* of Defrance. By W. BAIRD, M.D., F.R.S., &c.

The British Museum has just received, through the kindness of Mrs. Knocker, of Exmouth, a series of shells collected by her late husband, Captain H. H. Knocker, R.N., C.M.Z.S., at Whydah and the Bight of Benin on the west coast of Africa. Amongst these is a species belonging to the family Turritellidæ, which I at first considered might be referred to the genus *Proto* of Defrance. Upon more mature examination, however, of that genus as established by the French author mentioned above, I now believe this mollusk to be distinct and fairly entitled to be described as a new genus. I have therefore named it *Protoma*, from its resemblance to one of the species referred to that genus and from the slit in the under lip*. It may be thus defined :—

PROTOMA, nov. gen.

Testa turrita. Apertura ovalis, labro inferiore acute inciso. Operculum circulare, corneum, multispirale.

Fig. 1. Fig. 2.

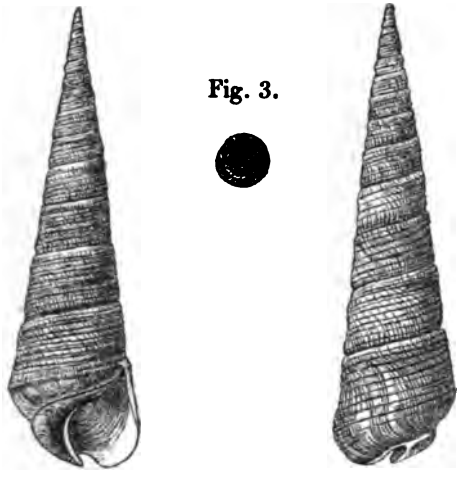


Fig. 3.

Fig. 1. *Protoma knockeri*, Baird.
2. —— ——, dorsal aspect.
3. Operculum.

* *Proto* and *τομή*, a slit.

As yet, we have only one species; and I propose naming it after its discoverer. It may be thus defined:—

PROTOMA KNOCKERI.

Testa elongato-subulata, transversim dense sulcata, sulcis minutis; anfractibus sedecem, planulatis, suturis distinctis; apertura ovalis, labro infra aperturam acute inciso; operculum circulare, parvum, multispirale, corneum.

Long. 2½ poll.

Hab. Whydah, west coast of Africa (*Capt. H. H. Knocker, R.N.*).

This species resembles in some respects, generically, the *Proto cathedralis* of Defrance. It is much smaller than that shell, however; the sulci or ridges are much finer and more numerous; and there are no large circular ribs or sulci at the base of the last whorl. Instead of merely an emargination on the under lip, this part of the shell is more sharply cut or incised, and the slit is more profound. The operculum, which fortunately exists in one specimen, is small, circular, and resembles that of *Mesalia* or *Turritella*. It is difficult to say what the colour is, as in the largest specimen we possess the shell is brown, while in all the others it is quite white or colourless.

Remarks on the Genus Proto *of Defrance.*

Taking the *Turritella cathedralis* of Brongniart to be the type, as Deshayes (in the last edition of Lamarck's 'An. sans Vertèb.') asserts it to be, of the genus *Proto* of Defrance, I was at first induced to consider the shell just described a species of that genus. A further examination, however, has decided me to alter my opinion, as the following observations will show.

In 1815, in the eleventh volume of the 'Linnean Transactions,' Leach established the genus *Proto* for a particular species of amphipodous Crustacea. This name has since then been adopted by Desmarest (in 1825), Johnston, A. White (in his 'Catalogue of the Crustacea in the British Museum'), and by Spence Bate (in his 'Catalogue of the Amphipoda in the British Museum').

In the same year (1815) the name of *Proto* was given by Oken, in his 'Lehrbuch,' to a genus of Annelidan worms belonging to the Naiadina. This genus was subsequently adopted by Œrsted in Kröyer's 'Tidsskrift' in 1843, and by Johnston in his 'Catalogue of the Non-parasitical Worms in the British Museum.' Grube, however, considers the genus *Proto* to be synonymous with another genus established by Oken in the same work, and called by him *Dero*. If this synonymy be correct and the genus *Dero* be adopted, we shall then have no difficulty in giving precedence to the genus formed by Leach.

To render the word *Proto*, however, still more perplexing, Defrance gave the same name to a genus of shells. In the 'Dict. des Sc. Nat. vol. xliii. (published in 1825), this author defined his genus; and about the same time it made its appearance in De Blainville's 'Manuel de Malacologie.' As the species upon which Defrance founded his genus was figured by him (and reproduced by Blainville in the

work mentioned above), under the name of *Proto maraschinii*, we find it represented as having the mouth perfectly round, and no appearance is shown of the slit or incision in the lower lip; neither is there any mention made of this character in his description. The genus *Proto* is defined by him as a shell having "a round mouth formed by the reunion of the left lip, which, passing circularly to that of the right side, terminates higher up towards the middle of the last whorl." It is also described as having the lower part of each whorl with a raised band round it, as in many of the species of the genus *Terebra*. The *Proto maraschinii* is said by him to be recent. The other species which have been referred to this genus are apparently quite different, both in the mouth and the body of the shell, and must be separated from it. They may possibly enter as species into the genus which I have now formed; and it is somewhat remarkable, if so, that no recent species have hitherto been found. However this may be, the name *Proto* having been previously used by Leach for a crustacean, and since then adopted by several carcinologists, must stand; and it has the precedence of Defrance's name by ten years.

In the same collection of shells made by Captain Knocker two or three specimens of a turritelliform shell occur, which agree in shape and size (about 9 lines long) with the *Proto maraschinii* as figured by Defrance. They are, however, so worn and rubbed, that it is impossible to ascertain exactly their identity.

I may also remark that a species of shell, *Cardita ajar*, occurring in the same collection (from the Bight of Benin) is likewise found fossil in the Miocene formation in Europe.

4. On the Genus *Pelargopsis*, Gloger.

By R. B. SHARPE.

In pursuance of the plan I before proposed to myself, of laying before the Society short synopses of the various genera of Kingfishers which are more or less obscure, I have now the pleasure of submitting a review of the genus *Pelargopsis*, or Stork-billed Kingfishers. By most authors these Kingfishers have been included in the genus *Halcyon*; but in my opinion they are more closely allied to *Ceryle*, to the larger members of which latter genus they bear unmistakable affinity. There is probably no group in the whole family of the "Alcedinidæ" which is involved in greater confusion than the present genus, consequent, apparently, on the close affinity of one species to another, and on the refusal of ornithologists to grant specific rank to the various well-characterized races of the brown-capped section of the genus, and likewise from the wrong identifications of the species of the older authors. I have endeavoured in the present paper to dispel the existing confusion; and by treating the various so-called "races" as good species, which, in my humble opinion, they decidedly constitute, a much clearer idea of the genus *Pelargopsis* may be arrived at.

I therefore propose to divide and classify the different species as follows. All the birds enumerated in the "*clavis*" present some distinguishing characteristic, while there are others which will not admit of a separate diagnosis; and these are therefore considered in the light of races or subspecies.

a. Rostro nigro ..... 1. *melanoryncha*.
b. Rostro rubro.
  a'. Scapularibus brunneis ..... 2. *amauroptera*.
  b'. Scapularibus cyaneis aut viridi-cyaneis.
    a''. Capite haud pileato, collo postico concolori.
      a'''. Major: supra viridi-cyanea ..... 3. *gouldi*.
      b'''. Minor: supra lætissime cyanea..... 4. *leucocephala*.
    b''. Capite indistincte pileato, ochrascenti-cinereo 5. *fraseri*.
    c''. Capite distincte pileato.
      a'''. Pileo haud cyaneo lavato.
        a''''. Pileo saturate brunneo ..... 6. *gurial*.
        b''''. Pileo albescenti-cinereo..... 7. *burmanica*.
      b'''. Pileo pallide brunneo, viridi-cyaneo distincte lavato ..... 8. *floresiana*.

I may state that the idea of separating these Kingfishers into different species has not been hastily conceived by me; on the contrary, the conclusions obtained in the present paper are the result of several months' patient study with a very large series of specimens at my command from all localities. It has, indeed, before been mooted whether these birds ought not to be separated as species; and Lord Walden has expressed his opinion (P. Z. S. 1866, p. 553) that the variations in plumage were also coincident with changes of locality.

1. PELARGOPSIS MELANORYNCHA (Temm.).

Alcedo melanoryncha, Temm. Pl. Col. 391 (1826); Schl. Mus. Pays-Bas, *Alced.* p. 15 (1863); *id.* Vog. Ned. Ind. *Alced.* pp. 10, 47, pl. 2 (1864).

Halcyon melanoryncha, Gray, Gen. of Birds, i. p. 79 (1846); Bonap. Consp. Gen. Av. i. p. 155 (1850); Cass. Cat. Halc. Phil. Mus. p. 10 (1852); Wall. Ibis, 1860, p. 142, et P. Z. S. 1862, pp. 335, 338.

Hylcaon melanoryncha, Reich. Handb. *Alced.* p. 18, t. cccxcix. f. 3074 (1851).

Ramphalcyon melanoryncha, Bonap. Consp. Vol. Anis. p. 10 (1854).

Entire body cream-colour, a little deeper on the throat, and approaching to pale orange on the abdomen and under tail-coverts; forehead dusky grey, the base of a few feathers on the crown also slightly showing this colour; cheeks and ear-coverts more decided dusky grey, the feathers narrowly edged or washed with cream-colour; middle of the back, scapularies, and wing-coverts brownish, washed with dull green, the latter narrowly edged with cream-colour at the tip; quills dark brown, the inner web white at the base, the basal half of the outer web of the primaries and the whole of the outer web of the secondaries dusky green; tail dusky green above, dark brown beneath; bill black; feet dusky; eyes dark brown.

Total length 14 inches, of bill from front 3·3, from gape 3·5, wing 5·9, tail 3·7, tarsus 0·45, middle toe 1·1, hind toe 0·5.

Hab. Celebes and Sula Islands (*Wallace*).

This is the most distinct species of the genus, easily recognizable by its jet-black bill. It appears to be by no means rare in the island of Celebes, several beautiful specimens having been forwarded to me from thence by my friend Mr. W. T. Fraser, from one of which the above description has been taken.

2. PELARGOPSIS AMAUROPTERA (Pears.).

Halcyon amauroptera, Pears. Journ. As. Soc. Beng. 1841, p. 635; Blyth, Ann. Nat. Hist. xii. p. 94 (1843); Gray, Gen. of Birds, i. p. 79 (1846); Blyth, Cat. Birds Mus. As. Soc. Beng. p. 313 (1849); Bonap. Consp. Gen. Av. i. p. 155 (1850); Cass. Cat. Halc. Phil. Mus. p. 10 (1852); Horsf. and Moore, Cat. Birds Mus. E. I. Co. i. p. 124 (1854); Jerdon, Birds of India, i. p. 224 (1862); Blyth, Ibis, 1866, p. 347.

Ramphalcyon amauroptera, Reich. Handb. *Alced.* p. 17, t. cccclxxxi. f. 3407 (1851); Bonap. Consp. Vol. Anis. p. 10 (1854).

Pelargopsis amauroptera, Cab. & Heine, Mus. Hein. Th. ii. p. 157 (1860).

Entire head, neck, and under surface of the body yellowish cinnamon; upper part of the back, scapularies, and wing-coverts chocolate-brown; entire back and rump silvery cobalt; quills chocolate-brown, the inner web light cinnamon at the base; tail-coverts and tail chocolate-brown, darker underneath; bill and feet sealing-wax red. Total length 13 inches, of bill from front 3, from gape 3·5, wing 5·8, tail 4, tarsus 0·5, middle toe 1, hind toe 0·5.

Hab. Bengal (Sundurbuns especially); Arakan; Tenasserim provinces; very abundant along the eastern coast of the Bay of Bengal, not yet observed on the western. Not rare in the vicinity of Calcutta (*Blyth*), Assam (*Mus. H. B. Tristram*).

I cannot understand how this very distinct and clearly characterized species could ever have been united under any circumstances to the more common *P. gurial*. The whole distribution of the colouring and the brown scapularies at once distinguish it. My description is from an Assamese specimen, kindly lent me by the Rev. H. B. Tristram.

3. PELARGOPSIS GOULDI, sp. n.

Whole head and neck and the whole of the under surface of the body rich ochre; upper part of the back, scapularies, wing-coverts, upper tail-coverts, and upper surface of the tail green, slightly inclining to blue on the latter; whole of the back and rump silvery cobalt; quills blackish, the inner web pale orange at the base, the exterior web of the primaries and nearly the whole of both webs of the secondaries bright cobalt; bill rich vermilion; feet dark red. Total length 13 inches, of bill from front 3·2, from gape 3·6, wing 6, tail 3·5, tarsus 0·5, middle toe 1, hind toe 0·5.

Hab. Philippines, Island of Luzon (*Cuming; mus. J. Gould*).

This new species forms the second of the uncapped section of the genus *Pelargopsis*, the other being the *P. leucocephala* (Gm.) from Borneo. From this latter species it is distinguished by its much larger size, and by the green colour of the upper surface of the body, this being in *P. leucocephala* of a rich ultramarine.

Mr. Blyth has referred to this bird as being the only species to which the much-disputed name of *leucocephala* is really referable. The specimen on which Mr. Blyth made this remark is a Manilla specimen collected by the late Mr. Cuming, and now in the Derby Museum at Liverpool. Mr. T. J. Moore, the well-known curator of the above-named museum, very kindly sent me the bird to examine. I found it apparently quite identical with a specimen in Mr. Gould's collection from Manilla; but, from long exposure to light, the Liverpool specimen has become so bleached that all the rich ochre colour has completely vanished from the head, leaving that portion white, whence Mr. Blyth's remarks.

I consider this species to be very distinct from the Javan species and from the Bornean, and propose to call it after Mr. Gould, who has always most kindly assisted me in my study of Kingfishers.

4. PELARGOPSIS LEUCOCEPHALA.

Martin-pêcheur de Java, Buff. Pl. Enl. 757.

Alcedo javana, Bodd. Tabl. Pl. Enl. 757 (1783, ex Buff.).

White-headed Kingfisher, Lath. Syn. i. pt. ii. p. 678 (1782).

Alcedo leucocephala, Gm. Syst. Nat. i. p. 456 (1788, ex Lath.); Lath. Ind. Orn. i. p. 248 (1790); Bonn. et Vieill. Enc. Méth. i. p. 288 (1823); Shaw & Nodd. Nat. Misc. pl. 793 (1807).

Halcyon leucocephala, Steph. Gen. Zool. viii. p. 100 (1826); Bonap. Consp. Gen. Av. i. p. 154 (1850); Sclater, P. Z. S. 1863, p. 213.

Alcedo javanica, Shaw, Gen. Zool. viii. p. 67 (1811).

Halcyon javana, Gray, Gen. of B. i. p. 79 (1846).

Halcyon javana (part.), Pelz. Reise d. Nov. Vög. p. 49 (1865).

Bakaka and *Rajah udong* of the natives of Banjermassing (*Motley*).

Head and back of the neck pale ochre; back of the neck richer ochre; upper part of the back and scapularies ultramarine, with a faint greenish lustre; lower part of the back extremely rich cobalt; wing-coverts rich ultramarine; quills dark blackish brown, the inner web pale ochre at the base, the basal half of the outer web of the primaries and the whole of the outer web of the secondaries very rich ultramarine; tail rich ultramarine above, black beneath; throat and cheeks pale ochre; rest of the under surface of the body rich ochre, a few of the flanks washed with ultramarine; bill dark sealing-wax red; feet dark red. Total length 13 inches, of bill from front 3, from gape 3·3, wing 5·8, tail 3·3, tarsus 0·45, middle toe 0·1, hind toe 0·45.

Hab. Borneo, Sarawak (*Wallace*); Banjermassing (*Motley*); Labuan (*Motley*).

As Lord Walden has suggested (P. Z. S. 1866, p. 553), the bird

figured by Buffon (*l. c.*) as the *Martin-pêcheur de Java* agrees very well with the Bornean *Pelargopsis*; and as the description also accords with the same bird, I see no reason to refuse the conclusion forced upon us in this manner. On this plate is founded the *Alcedo javana* of Boddaert; but this name must be dropped as inapplicable, and the term *leucocephala*, the next in order of priority, be substituted.

5. PELARGOPSIS FRASERI, sp. n.

Ispida capitis bonæ spei, Briss. Orn. iv. p. 488.

Alcedo capensis, Linn. Syst. Nat. i. p. 180 (1766, ex Briss.); Bon. et Vieill. Enc. Méth. i. p. 285 (1823).

Halcyon capensis, Bonap. Consp. Gen. Av. i. p. 154 (1850); Eyton, P. Z. S. 1839, p. 101.

Ramphalcyon javana, Reich. Handb. *Alced.* p. 7, t. cccxcviii. *b.* fig. 3406 (1851, nec Bodd.).

Halcyon javana, Cab. & Heine, Mus. Hein. Th. ii. p. 156 (1860, nec Bodd.).

Halcyon javanica, Cass. Cat. Halc. Phil. Mus. p. 11 (1852, nec Shaw).

Halcyon javana (part.), Pelz. Reise d. Nov. Vög. p. 49 (1865).

Alcedo leucocephala, Horsf. Trans. Linn. Soc. xiii. p. 174 (1822, nec Gm.).

Halcyon leucocephalus, Blyth, Cat. Birds Mus. As. Soc. Beng. p. 46 (1849); Bonap. Consp. Gen. Av. i. p. 154 (1850); Horsf. & Moore, Cat. Birds Mus. E.-I. Co. i. p. 123 (1854, pt.); Moore, P. Z. S. 1854, p. 268.

Burong-Kaha of the natives of the Malay peninsula (*Eyton*).

Tengke-Buto of the Javans (*Horsfield*).

Head indistinctly capped, ashy brown, strongly washed with pale ochre; space between the bill and the eye, cheeks, and ear-coverts more decidedly ashy grey; sides and back of the neck ochre; upper part of the back and scapularies indigo-blue, with more or less of a greenish tinge; whole of the back rich cobalt; wing-coverts blue, with a slight greenish lustre; quills pale brown, the inner web light ochre at the base, the outer web, especially of the secondaries, indigo; tail indigo above, black beneath; under surface of the body ochre, tinged with whitish on the throat; bill dark sealing-wax red; feet dark red. Total length 14 inches, of bill from front 3·3, from gape 3·7, wing 6·2, tail 3·8, tarsus 0·45, middle toe 1, hind toe 0·45.

Hab. Java (*Horsfield, Wallace*); Malacca (*mus. R. B. S.*); Penang (*Cantor; mus. R. B. S.*).

a. Sumatran race.

Alcedo leucocephala, Raffl. Trans. Linn. Soc. xiii. p. 293 (1822).

Baug Kaha of the natives of Sumatra (*Raffles*).

Hab. Sumatra (*Raffles, Wallace*).

The Sumatran race of *P. fraseri* is much smaller, the blues slightly more intense, but the bird appears to be not specifically separable.

After carefully comparing a skin of the adult Javan bird with Brisson's elaborate description, I believe that his "*Ispida capitis bonæ spei*" was really taken from a Javan specimen. Consequently the species stands primarily as *Alcedo capensis*, Linn. But in the face of the manifest incongruity of such an appellation, I believe myself justified in proposing a new name for the bird, and I therefore take the opportunity of connecting with it the name of my friend Mr. W. T. Fraser, of Soerabaya, Java, to whom I am indebted for many kind remittances of Javan Kingfishers.

It is very seldom that we meet with a specimen of *P. fraseri* with any thing like a distinct cap. Mr. Wallace's collection, however, contains a specimen obtained by himself in Eastern Java which has the cap very distinct, like the bird figured by Professor Reichenbach (*l. c.*). The species, however, differs from *P. burmanica* by always having an admixture of ochre, sometimes very distinct, in the feathers of the head.

6. Pelargopsis gurial.

Halcyon gurial, Pears. Journ. As. Soc. Beng. 1841, p. 633 (descr. orig.); Blyth, Cat. Birds Mus. As. Soc. Beng. p. 47 (1849); Bonap. Consp. Gen. Av. i. p. 155 (1850); Irby, Ibis, 1861, p. 228; Blyth, Ibis, 1865, p. 30.

Ramphalcyon gurial, Reich. Handb. *Alced.* p. 16, t. ccccxxvi. (1851).

Pelargopsis gurial, Cab. & Heine, Mus. Hein. Th. ii. p. 156 (1860).

Halcyon capensis, Jerd. Madr. Journ. 1840, p. 231; Blyth, Ann. Nat. Hist. xii. p. 94 (1843).

Halcyon brunniceps, Jerd. Madr. Journ. 1844, p. 143.

Halcyon leucocephalus (part.), Horsf. & Moore, Cat. Birds Mus. E.-I. Co. p. 123 (1854).

Halcyon leucocephalus, Jerdon, Birds of India, i. p. 222 (1862); Day, Land of Perm. p. 460 (1863); Beav. Ibis, 1865, p. 407; Blyth, Ibis, 1866, p. 347.

Gurial of the Bengalese (*Pearson*).

Mala-poyma of the natives of Malabar (*Jerdon*).

Head dark chocolate-brown; sides of the neck and a collar encircling the same pale ochre; upper portion of the back and scapularies dull green; rest of the back rich greenish cobalt; wing-coverts dull green with a faint blue lustre; quills black, the inner web yellowish white at the base, the outer edge of the whole of the feathers greenish blue; tail greenish blue above, black beneath; under surface of the body ochre, palest on the throat; bill very dark sealing-wax red; feet dull red. Total length 14 inches, of bill from front 3·1, from gape 3·7, wing 6·4, tail 3·6, tarsus 0·5, middle toe 1·1, hind toe 0·5.

Hab. All India, from the extreme south to Bengal and Ceylon; common in Malabar; rarely seen in the Carnatic and upon the table-land; occasionally found in Central India and the Northern Circars;

most abundant in Bengal, but apparently not found, or rare, in the north-west (*Jerdon*).

a. Assamese and Nepaulese race, with the head a little lighter brown.

Halcyon leucocephalus, Horsf. P. Z. S. 1839, p. 156; Gray, Cat. Fiss. Brit. Mus. p. 55 (1848, pt.); Horsf. & Moore, Cat. Birds Mus. E.-I. Co. p. 123 (1854).

Halcyon capensis, J. E. & G. R. Gray, Cat. Birds and Mamm. of Nep. p. 56 (1846).

Halcyon gurial, J. E. & G. R. Gray, Cat. Birds and Mamm. of Nep. p. 24 (1863).

b. Malacca race. Much smaller. Head much darker and generally glossed, sometimes also a slight blue lustre being apparent.

This race must ultimately be separated specifically, and I name it provisionally *Pelargopsis malaccensis*. Its nearest ally is *P. gurial*; but it is altogether smaller, the blues are always much brighter, and it must be remembered that true *P. gurial* never really approaches the range of this Malacca bird. Between the ranges of the two species intervene *P. burmanica* and *P. amauroptera*.

Professor Schlegel states, in his "Catalogue," that a Nepaulese specimen in the Leyden Museum is "*absolument semblable aux individus de Java.*" This statement, which seems to have taken Mr. Blyth by surprise (*vide* 'Ibis,' 1866, p. 347), certainly astonished me considerably. I think, however, that there must be a mistake in the labels of the specimens examined by the learned Professor; for I have in my collection a Stork-billed Kingfisher from Assam, which agrees in every respect with specimens in the British Museum from Nepaul, presented by Mr. Hodgson, from whom also Professor Schlegel obtained his specimen. These birds differ a little in the colour of the cap, which is a shade lighter brown than in true *P. gurial* from India, but I have never seen an *adult* Javan specimen with such a clearly defined cap.

Reichenbach, in the letterpress of his work, refers to "t. cccxcix. fig. 3075" as being the figure of *Ramphalcyon gurial*. This is a mistake, as this figure is a copy of Buffon's plate 757 (*P. leucocephalus* of this paper), and the reference given in the list of plates to Reichenbach's work, viz. "t. ccccxxvi. fig. 3158" is really the representation of *R. gurial*.

7. PELARGOPSIS BURMANICA, sp. n.

Halcyon leucocephalus, Gould, P. Z. S. 1859, pp. 151, 152; Schomb. Ibis, 1864, p. 247; Beav. Ibis, 1866, p. 221; Walden, P. Z. S. 1866, p. 553; Beav. Ibis, 1867, p. 318.

Halcyon leucocephalus (part.), Horsf. & Moore, Cat. Birds Mus. E.-I. Co. i. p. 123 (1854).

? *Ramphalcyon capensis*, Reich. Handb. *Alced.* p. 16, t. cccxcix. f. 3072, 3073 (1851).

Head, which is distinctly capped, clear albescent grey; sides of the neck and a collar encircling the same very deep ochre; upper part of

the back and scapularies dull green, with a faint blue lustre here and there; whole of the back very rich cobalt; wing-coverts greenish, more distinctly washed with blue; quills brown, the inner web pale ochre at the base, the exterior web, especially of the secondaries, externally edged with bright blue; tail bright blue above, dark brown beneath; entire under surface very deep ochre; bill dark vermilion; feet dark red. Total length 14 inches, of bill from front 3·4, from gape 3·7, wing 6, tail 3·8, tarsus 0·5, middle toe 1, hind toe 0·5.

Hab. Tavoy, Tenasserim Provinces (*Briggs*); Burmah (*Blyth; mus. Lord Walden*); Siam (*Schomburgk; Mouhot, mus. J. Gould*); Andaman Islands (*Tytler, Beavan*).

This species may be distinguished at a glance by the colouring of the cap, which is always of a light grey, very different from the dark brown cap of *P. gurial*. Its principal habitat seems to be Burmah, whence it ranges into Siam to the eastward, and perhaps into the Malayan peninsula to the southward.

The plates of Reichenbach's work are so inaccurate that it is only doubtfully that I refer the figures given in his 'Tabulæ' to the present species. Its range is stated by him to be the Cape of Good Hope, South and South-eastern Africa generally (*Dresden Museum*), which statement naturally does not aid one in a correct determination of the locality of the specimens figured.

8. PELARGOPSIS FLORESIANA, sp. nov. Flores Kingfisher.

Martin-pêcheur du Cap de Bonne Espérance, Buff. Pl. Enl. 590.
Halcyon leucocephalus, Wald. P. Z. S. 1863, p. 484 (nec Gm.).
Halcyon capensis, Swains. Classif. of B. ii. p. 335 (1837, nec Linn.).

Head (distinctly capped) pale brown, with a bluish-green lustre; cheeks, sides of the neck, and a collar encircling the back of the neck pale ochre; upper part of the back and scapularies ultramarine with a tinge of green; back rich cobalt, deepening into ultramarine on the rump and upper tail-coverts; quills brownish black, the inner web pale ochre at the base, the outer web, especially of the secondaries, washed with blue; tail rich blue above, black beneath; under surface of the body deep ochre, much paler on the throat; bill dark sealing-wax red, black at the tip; feet dark red. Total length 13·5 inches, of bill from front 3·2, from gape 3·7, wing 5·7, tail 3·6, tarsus 0·45, middle toe 1, hind toe 0·45.

Hab. Flores (*Wallace*).

In all specimens of the Stork-billed Kingfisher that I have examined from the island of Flores, there has always been a very distinct greenish lustre on the head; and as the colour of the cap is always a pale brown, and these characters appear to be constant, I do not hesitate to separate it specifically.

Buffon's plate represents the bird with a green head; I have carefully compared an adult Flores specimen with the description given by him, and it agrees very well indeed; so that I think it extremely probable that the present species formed the subject of his plate. I



J. Smit lith. M & N Hanhart imp.

CAMPEPHAGA ANDERSSONI.

do not consider Buffon's *Martin-pêcheur du Cap de Bonne Espérance* to be the same bird as Brisson's "*Ispida capitis bonæ spei*" (= *A. capensis*, Linn.); and I think it probable that Buffon hastily referred his bird to Brisson's species, the exact localities of both being unknown.

Table of the Geographical Distribution of the Genus Pelargopsis.

	Indian Region.													Australian Region.				
	Indian Asia.				Chinese Asia.					Indo-Malay Islands.				Celebes.		Timor group.		
	India.	Ceylon	Nepaul.	Assam.	Arakan.	Andaman Isl.	Burmah.	Siam.	Tenasserim pr.	Malacca and Singapore.	Sumatra.	Java.	Borneo.	Philippines.	Celebes.	Sula Island.	Lombok.	Flores.	Timor.
1. P. melanoryncha	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	*	...	...	...
2. P. amauroptera	*	...	...	*	*	...	...	...	*	...	...	...	...	...	...	...	...	...	...
3. P. gouldi	...	...	...	...	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
4. P. leucocephala	...	...	...	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...	...
5. P. fraseri	...	...	...	...	...	...	...	...	...	*	...	*	...	...	...	...	...	...	...
a. Sumatran race	...	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...	...	...	...
6. P. gurial	*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Assamese race	...	...	*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Malaccan race (*P. malaccensis*)	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...	...	...	...	...
7. P. burmanica	...	...	...	...	...	*	*	*	...	...	...	...	...	...	...	...	...	...	...
8. P. floresiana	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	...

5. On *Campephaga anderssoni*, an apparently undescribed Species of this Genus from South-western Africa. By R. B. SHARPE.

(Plate IV.)

In the last collection made by the late Mr. C. J. Andersson from Damara Land and the adjacent district of Ovampo, I found the bird which forms the subject of the present paper. So far as I can make out, it is not included by Dr. Hartlaub in his elaborate paper on the *Campephaginæ* ("Monographische Studien über die Gruppe der Campephaginen, von Dr. G. Hartlaub," Journ. f. Orn. 1865, p. 153). According to the descriptions given in the learned doctor's monograph, the Damara bird would appear to be closely allied to *Campephaga frenata* (Heugl. Journ. f. Orn. 1864, p. 255) from the Bogos country; but it differs conspicuously in the colour of the throat. I therefore propose to call it after Mr. Andersson, whose untimely

death will not fail to be regarded by every one as a most serious loss to the cause of African ornithology.

CAMPEPHAGA ANDERSSONI, sp. n. (Plate IV.)

C. *supra pulchre cinerea, uropygio paullo pallidiore; remigibus cinerascentibus, secundariis externe cinereo lavatis et gracillime albo marginatis; rectricibus mediis cinereis, reliquis nigris albo terminatis, duobus extimis albo marginatis: fronte basali et regione oculari albis, loris nigricantibus: subtus purissime alba, gutture circumscripte pallide cinereo.*

Long. tot. 9 poll. Angl., al. 5·4.

Hab. in terra Damarensi.

Above delicate grey, a little lighter on the rump; wing-coverts uniform with the back; quills ashy brown, exteriorly margined with white; the outer web of the inner secondaries light grey, the innermost secondaries being entirely of this colour; tail black, narrowly tipped with white, the two middle feathers ashy grey, with obscure cross markings in some lights, the outer rectrix having the outer web white; the base of the forehead and the feathers in front of and round the eye white; the space between the base of the bill and the eye black; the entire under surface of the body pure white, the throat with a crescent-like band of clear grey, cutting off the chin from the breast, both of these being pure white; bill and feet black. Total length 9 inches, of bill from front 0·7, wing 5·4, tail 4·7, tarsus 0·85.

Hab. Ovaquenyama, Damara Land, June 25th, 1867 (*C. J. Anderson; spec. in mus. R. B. S.*).

Besides an apparent difference in the extent of white on the exterior tail-feathers, this new species seems at once to be distinguished from *Campephaga frenata* by the colour of the throat, which in this latter species, according to Dr. Hartlaub's description (*l. c.*), is entirely obscure greyish ashy.

6. Notes on the Skulls of the Genus *Orca* in the British Museum, and notice of a Specimen of the Genus from the Seychelles. By Dr. J. E. GRAY, F.R.S.

Mr. Swinburne Ward has kindly sent a very beautiful skull of a "Killer" taken in the sea near the Seychelles Islands.

To determine this skull I have been induced to compare the skulls of the genus in the British Museum, which it is very necessary to do from time to time, as specimens gradually accumulate, and often arrive when I am occupied on other subjects, and consequently are put aside for future examination.

In this examination I have observed that in the 'Catalogue of Seals and Whales' I have confounded the skull described under the name of *Orca capensis* with one from the North Pacific, the former being the true *Orca capensis*, and the skull now received from the Seychelles Islands being of the same species.

The skull figured in the 'Zoology of the Erebus and Terror' under the name of *O. capensis* is from a specimen received from the Zoological Society, to which it was presented by Capt. Delville, who said he obtained it in the North Pacific (?). It is quite a different species, for which I propose the name of *Orca pacifica*. I doubt its being from the *North* Pacific, as I believe there is a skull of the same species in the Paris Museum, collected by M. Eydoux, and said to come from Chili.

This reexamination has convinced me, and also, I believe, Mr. Flower, that the skull described under the name of *Orca intermedia* belongs to a very small species, and is not "the skull of a very young individual, probably of one of the large species," as Mr. Flower supposed, apparently from the examination of the figure (see Flower, P. Z. S. 1864, p. 425). Indeed, when the animal is known, I should not be at all astonished if it should prove to be a large species of *Electra* rather than of *Orca*, or perhaps a new genus.

The examination of the four skulls of *Orca* found on the English coast show they belong to two very distinct species, one with a much more attenuated beak than the other.

The *Orca brevirostris*, Owen, is only known from the skull of a very young animal. I have formed for it the genus *Orcaella*, and consider that it belongs to the tribe Delphinina, and not Orcadina (see Gray, 'Synopsis of Whales and Dolphins,' p. 7).

I. *The beak from the notch before the orbit the same length as from the notch to the condyles; the width at the notch three-fifths of the length of the beak. The occipital end of the skull slightly concave; condyles of moderate size; lower jaw broad on the sides, very thick and solid in front.* ORCA.

A. *The beak of the skull tapering and narrow in front, end narrow.* GLADIATOR.

1. ORCA STENORHYNCHA. (Fig. 1, p. 72, and fig. 3, p. 74.)

Orca gladiator, Gray, Cat. Seals and Whales, p. 279.

North Sea. Skeleton from Weymouth, and a skull from the English coast. B.M.

Intermaxillaries narrow in the middle and rather dilated in front, but the extent of dilatation varies in the two specimens.

B. *Beak of the skull spatulate; sides of the hinder half nearly parallel, of the front half arched and converging; end rounded, middle rather wider than at the notch.* ORCA.

2. ORCA CAPENSIS, Gray, Cat. Seals and Whales, p. 283. (Fig. 2, p. 73, and fig. 4, p. 75.)

Delphinus orca, Owen.

Grampus gladiator, Smith, South-African Zool. p. 126.

Hab. Cape of Good Hope (*Viney*, B.M.; *Villette*, Mus. Coll. Surg. no. 1139); Seychelles Islands (*Swinburne Ward*).

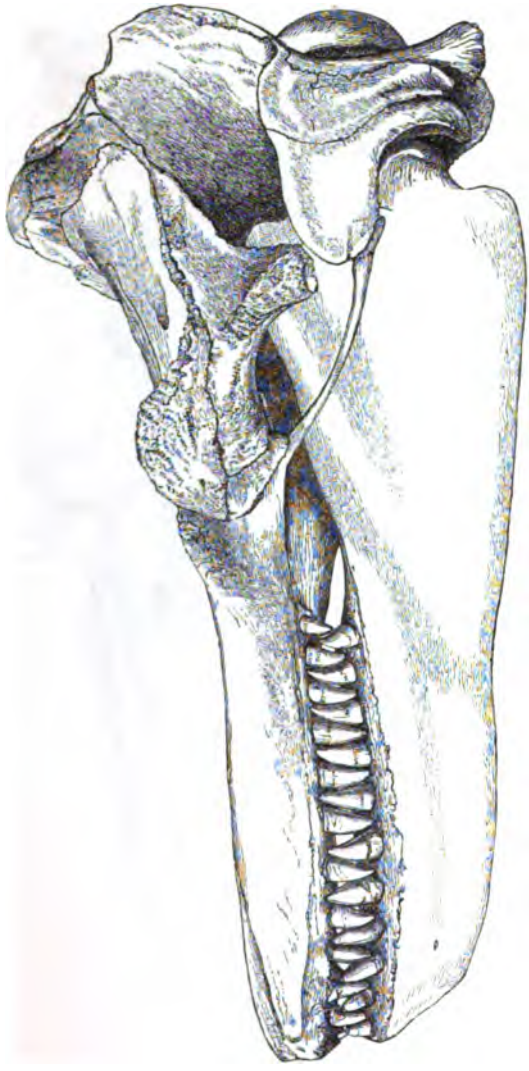
In the Cape specimen the intermaxillaries are nearly of the same

Fig. 1.



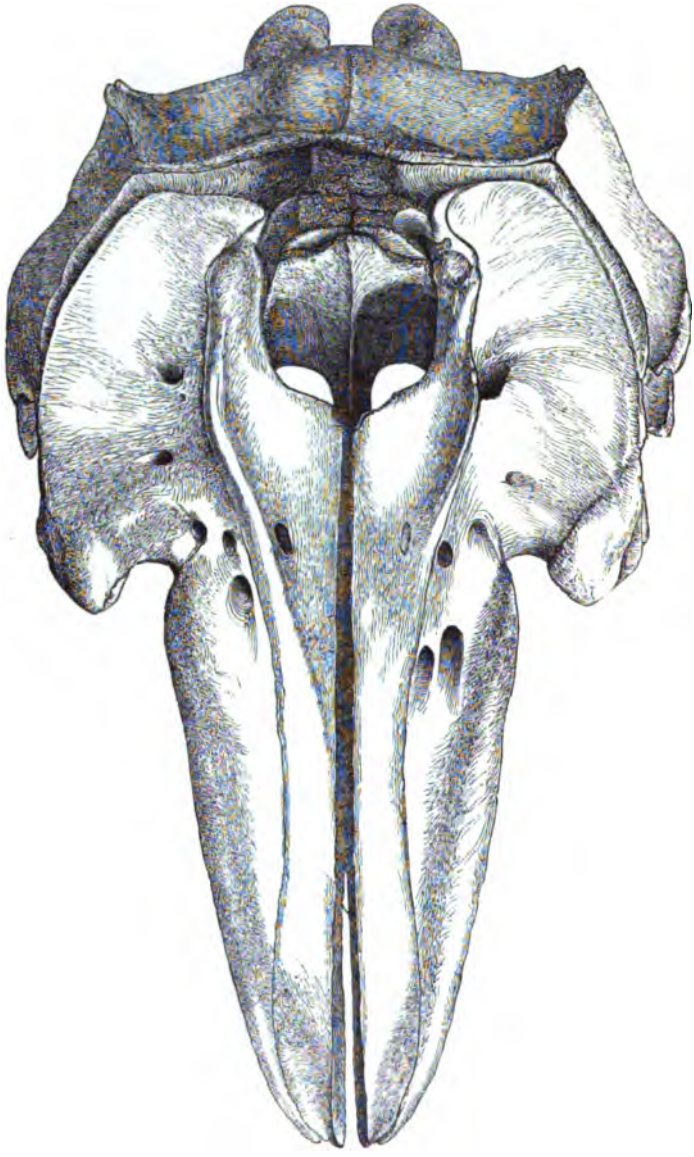
Orca stenorhyncha.

Fig. 2.



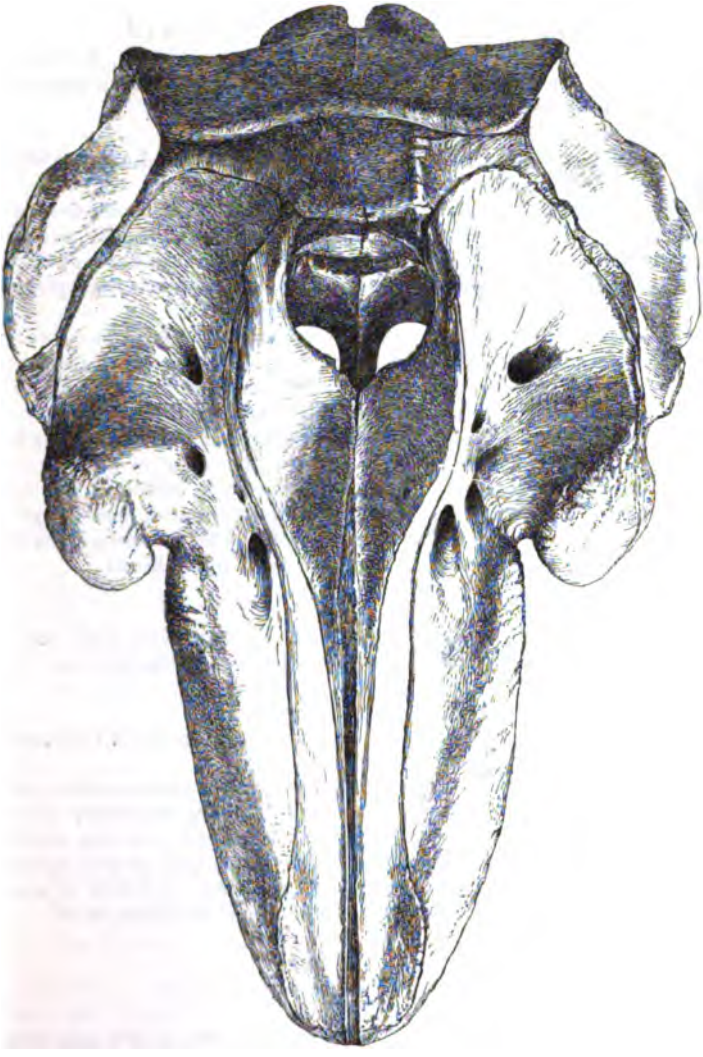
Orca capensis.

Fig. 3.



Orca stenorhyncha.

Fig. 4.



Orca capensis.

width in the whole of their length; in the Seychelles skull they are contracted in the greater part of their length, and rather dilated in front.

3. ORCA LATIROSTRIS.

Delphinus orca, Cuv. Oss. Foss. v. tab. 22. fig. 4 (skull).

The skull very similar to that of the Cape species, but much smaller; but the beak is rather narrower, the intermaxillaries moderately broad, slightly dilated in front.

Hab. North Sea.

An adult skull from the coast of Essex (361 *a*), and another without the lower jaw, are in the British Museum.

These skulls of the smaller British or, rather, European *Orca* are distinguishable from those of *O. gladiator* by the smaller size and the broader, rounder nose—and from the skulls of the Cape-of-Good-Hope species by being of a much smaller size, and having a depressed crown of the head.

I believe the skull figured under the name of *Delphinus orca* by Cuvier, Oss. Foss. vol. v. tab. 22. figs. 3, 4, represents this species, from the form of the beak and the narrowness of the occiput: this figure has been copied by various British and other authors.

Gervais, in the 'Zoology and Paleontology of France,' figures the skull of a young *Delphinus orca*, taken on the coast of Cette, which is now in the Museum of Paris. It appears to belong to this species, or it may be that the *Orca* of the Mediterranean does not grow to the usual size; or, again, it may be of a different species, for the skull is only fifty-eight centimetres long and thirty broad.

4. ORCA MAGELLANICA.

Orca magellanica, Burmeister, Ann. & Mag. Nat. Hist. ser. 3. vol. xviii. p. 101; An. Mus. Publ. de Buenos Ayres, vol. i. p. 373, tab. 22.

Hab. Patagonia (Mus. Buenos Ayres).

This species, according to the figure, is very like *Orca latirostris*.

II. *The beak from the notch before the orbit the same length as from the notch to the condyle; width at the notch two-thirds the entire length of the beak. Intermaxillaries very narrow, slightly dilated in front; brain-cavity broad; occiput deeply concave. Lower jaw very broad on the sides, very thick and solid in front.* OPHYSIA, Gray, Synopsis of Whales and Dolphins, p. 8.

5. ORCA PACIFICA.

Delphinus globiceps, Grant, P. Z. S. 1833, p. 65.

Delphinus orca, Eydoux, Mus. Paris.

Orca capensis, Gray, Zool. Erebus and Terror, p. 34, tab. 9, not Cat. Seals and Whales, p. 283.

Orca (*Ophysia*) *capensis*, Gray, Synopsis of Whales and Dolphins, p. 8, tab. 9 (skull).

Hab. North Pacific (*Capt. Delville, R.N.*).

Skull, from the Zoological Society's collection.

III. *The beak of the skull from the notch rather shorter than from the notch to the condyle, depressed, flat above, gradually tapering in front; the width at the notch two-thirds of the entire length of the beak. Lower jaw slender, narrow and thin in front.* FERESA.

6. ORCA INTERMEDIA.

Orca intermedia, Gray, Cat. Seals and Whales, p. 283; Zool. Erebus and Terror, p. 34, tab. 8 (skull).

Hab. —— ?

This is the skull of a very small species of the genus. It is evidently one of a full-grown animal, and yet it is not so large as the skull of a newly born specimen of the other species. Mr. Flower, judging from the figure, believed it to be the skull of a very young animal; but on examining the skull along with me he became satisfied, from the solidity and definite form of the bones, that it is the skull of a full-grown though not aged specimen.

This skull has many resemblances to the skull of some of the species of *Electra*; the teeth are much smaller than those of *Orca*.

The following are the measurements of the different skulls of the genus in the collection of the British Museum; they are carefully taken with calipers by Mr. Edward Gerrard.

	O. stenorhyncha.				*O. capensis.*		*O. latirostris.*		*O. pacifica.*		*O. intermedia.*	
	361 *b.*		361 *c.*		1065 *b, c.*		361 *a.*		1065 *a.*		362 *a.*	
	in.	lin.	in.	lin.	in.	lin.	in.	lin.	in.	lin.	in.	lin.
Length from end of nasal to centre of occipital condyle	35	0	37	0	39	0	33	0	36	6	14	0
Length of nose	17	6	18	6	22	6	17	0	18	0	7	0
—— of tooth-line	13	6	14	0	16	0	13	0	14	6	4	9
—— of lower jaw	27	6	30	0	31	0	26	0	29	6	11	3
Breadth at the notch	10	6	11	0	12	0	10	0	12	6	4	9
—— at the orbit	18	0	19	6	20	0	18	0	21	0	8	6
—— at temple above	18	0	19	6	20	0	18	0	20	0	9	0
—— at middle of beak	9	0	10	0	11	0	9	6	10	0	3	6
—— at intermaxillaries	3	3	3	3	4	6	3	3	3	6	0	9

7. On a Larval *Œstrus* found in the Hippopotamus. By JAMES MURIE, M.D., F.L.S., F.G.S., &c., Prosector to the Society.

Neither in the comprehensive 'Monographie der Œstriden' of Frederich Brauer (Vienna, 1863), nor in the writings of others who have treated of species of the Œstrid family of Diptera, in the larval or imago state, do I find any mention that the Hippopotamus occasionally serves as a nidus for the immature insect. For this reason I place the following observation of such a case on record.

A number of the orders of Mammalia are subjects whereon or

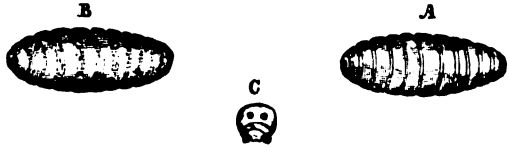
within the bodies of which the ova of Œstridæ are reared, and none more frequently so than the *Artiodactyla*. It is not, therefore, to be wondered at that the Hippopotamus, belonging to this group, should be so troubled.

During two years' sojourn in the countries bordering the Upper White Nile, our party met with and shot at innumerable Hippopotami; but only in two instances were the animals with certainty killed and the bodies secured. As may easily be understood, whenever Hippopotami are seen in the river within range, they are fired at by the voyagers; consequently the animals are shy. Most often under cover of night do they freely snort, and approach close to the vessels. When shot at or hit they quickly disappear; so it is difficult to tell whether they have received a mortal wound or not.

I may further incidentally mention that I have partaken of the flesh, which is beef-like in fibre, but sweeter to the taste. It is peculiar in containing a vast amount of watery or sanguineo-serous element. Thus on being cooked it shrinks very much, and when dried in the sun in strips diminishes in volume in a most extraordinary manner.

The adult Hippopotamus from which the grub in question was extracted was killed in the river Ayi, near Wayo, in Moro, lat. 4° 46′ N. and long. 30° 26′ 20″ E., on the 30th January, 1863. It was the day following ere the body was recovered, it having floated some little distance down stream from where it was shot. The cranium in a rough condition alone was brought to camp, the entrails and flesh of the body having been cut up piecemeal and carried off by the Negroes. Whilst ridding the skull of parts liable to decompose I dissected out both eyes, and among the fatty and fibrous tissues of the left orbit was surprised to find a large maggot. For the moment I was inclined to regard it as the produce of a Blowfly, and was amazed at what seemed the excessively rapid growth of the Blowfly's ova; for the Hippopotamus at this time had not been slain above forty hours. More extended examination of the parts, however, convinced me this could not be the case, as the larva was solitary, situated deeply within the orbit, and differed materially from the common maggot.

I thereupon made sketches of the specimen, of the natural size; and these have been reproduced in the accompanying figures.



Larva from the orbit of Hippopotamus. Nat. size.
A. Upper view. B. Abdominal surface. C. Anal extremity.

The characters may be given as undernoted.

Colour yellowish white. Body cylindrical, tapering obtusely at

either end. Extreme long diameter 0·9 inch, and its greatest transverse one 0·3 inch. Some ten or more slightly raised ridges surround the body; ventrally these are covered with short fine hairs or setæ. On the abdominal surface, close to the head, are two hooklets, by which the animal fixes itself to the flesh. There are two prominent black spots at the anal extremity, beneath these a lip-like projection (the anus), the lower part of which has minute spines; and in this view (C) two nipple-like limbs stand out on each side.

Herr Brauer, *l. c.* p. 276, has given a very useful tabular statement of the various orders, families, and species of mammals in which Œstrid larvæ have been found. There is added to each mammalian species the name of the insect, and the part of the body where it was located. Throughout the work there is a full detail of the history, synonyms, &c. of the species; and a copious *résumé* of the literature on the subject precedes the descriptive text.

From his classified Table the subjoined list is drawn; but the present arrangement is altered, and the orders, genera, and species of mammals adapted to our Society's 'List of Vertebrated Animals,' for 1866. Some of the common names have been taken from Dr. Gray's Catalogue of Mammalia in the British Museum, 1843.

The object, then, of the following list is to call the attention of anatomists at home, naturalists, sportsmen, Fellows of the Society, and others abroad to the circumstance that any larvæ found by them in cutting up or skinning animals other than those here given, perchance may belong to a species of insect new to science. At all events every observation must add to a better knowledge of the life-history of those already known.

Whilst entomologists have acquaintance with the imago insect, they often lack information as to the larval form, which those engaged in different pursuits might supply.

List of Mammals in which Œstri *larvæ have been found.*

BIMANA.

Man. *Homo sapiens*, L.

QUADRUMANA.

Monkeys. *Simiæ platyrrhinæ*, genus et sp.?

CARNIVORA.

Domestic Dog. *Canis familiaris*, L.
Striped Hyæna. *Hyæna striata*, Zimm.
Jaguar. *Felis onca*, L.
Common Badger. *Meles taxus*, Schreb.

RODENTIA.

Brazilian Squirrel. *Sciurus æstuans*, Linn.
Squirrel. *Sciurus aureogaster*, Cuv.
Hackee. *Sciurus* (*Tamias*) *lysteri*, Ray.

Marsh-Hare. *Lepus palustris*, Bachman.
Hare. *Lepus*, sp?
Sadajac. *Lagomys alpinus*, Desm.
Fur-country Pouched Rat. *Saccophorus borealis*, Rich.

ARTIODACTYLA.

Common Camel. *Camelus dromedarius*, L.
Domestic Sheep. *Ovis aries*, L.
Siberian Wild Sheep. *Caprovis argali* (Pall.).
Domestic Goat. *Capra hircus*, L.
Wild Goat. *Capra ægagrus*, Gm.
Sassaby. *Acronotus lunatus*, Burch.
Riet Bok. *Heleotragus reduncus*, H. Smith.
Gazelle. *Gazella dorcas*, L.
Saiga Antelope. *Saiga tartarica*, Pall.
D'seren. *Procapra gutturosa*, Pall.
White-tailed Gnu. *Catoblepas gnu*, Gm.
Brindled Gnu. *Catoblepas gorgon*, H. Smith.
Domestic Ox. *Bos taurus*, L.
Cape Buffalo. *Bubalus caffer*, Sparr.
Moose or Elk. *Cervus alces*, L.
Red Deer. *C. elaphus*, L.
Fallow Deer. *C. dama*, L.
Mule Deer. *C. macrotis*, Say.
Roebuck. *C. capreolus*, L.
Reindeer. *Rangifer tarandus*, L.
Musk-deer. *Moschus moschiferus*, L.
Hippopotamus. *H. amphibius*, L.

PERISSODACTYLA.

Common Horse. *Equus caballus*, L.
Domestic Ass. *E. asinus*, L.
The Mule. *E. mulus*.
Two-horned Rhinoceros. *Rhinoceros bicornis*, L.
Burchell's Rhinoceros. *R. simus*, Burch.

MARSUPIALIA.

Opossum. *Didelphys philander*, L.

8. Note on a Specimen of *Aquila barthelemyi* recently living in the Society's Gardens. By JAMES MURIE, M.D., Prosector to the Society.

The following letter from Mr. Gurney to me explains itself. I shall only preface a memorandum on the receipt and disposal of the specimen as far as the Society is concerned.

The example of *Aquila barthelemyi*, Jaub., referred to was obtained

from St. Victoire, France. It was purchased by the Society 30th April, 1866, and died 13th November, 1869. It proved to be a male on dissection. The specific wing-markings being absent when the body was received by me, I thought proper to place it in Mr. George Gray's hands for identification. This gentleman pronounced it, as appearing to him, no other than *A. chrysaëtos*, Linn. The skin, being in poor condition, was not kept; but the skeleton was retained by him for the National Osteological Collection. In case that any doubts might hereafter arise regarding the specimen, I considered that the history of the bird should be attached to the skeleton as well as published. Mr. Gurney coincided with me in this opinion, and at my request kindly forwarded the accompanying note for that purpose.

"Nov. 24, 1869.

"My Dear Sir,—You will find in the volume of the 'Ibis' for 1864, p. 339, the account of two young specimens of *A. barthelemyi* which came into my possession in 1857, and the survivor of which six or seven years afterwards obtained the white scapular spots which are found close to the junction of the wing with the body in the Eagle to which the above name has been assigned.

"These marks were very beautiful and conspicuous when I wrote the paper in the 'Ibis' above referred to; but subsequently to the specimen passing into the hands of the Zoological Society in 1866, they seem to have disappeared, and I conclude from what you tell me that they were not apparent in the bird at the time of death.

"I doubt much whether *Aquila barthelemyi* be a race entitled to specific rank, but whatever it be, the bird in question which passed from my possession to that of the Zoological Society, and of which the skeleton is now in the British Museum, undoubtedly belongs to it, and is entitled to the name of *A. barthelemyi*, if that name be recognized as of specific value.

"I am, &c.,

"J. H. Gurney."

9. Descriptions of Seventeen New Species of Land Shells from the South-Sea Islands, in the Cabinet of Mr. John Brazier of Sydney. By Dr. James C. Cox, C.M.Z.S.

1. Helix allecta.

Shell with a deep open funnel-shaped umbilicus, depressedly orbicular, thin, uniformly closely and strongly striated, the striæ of a dull, dark-reddish chestnut-colour; spire flat; whorls 4½ to 5, convex, the last not descending in front; suture deep and excavated; aperture rounded; peristome simple, obtuse, columellar margin dilated.

Diam., greatest 0·10, least 0·08; height 0·04 of an inch.

Hab. Upolu, Navigator's Islands; found on the mountains, under decayed wood (*Brasier*).

2. HELIX WANGANENSIS.

Shell perforated, depressed, thin, hyaline, smooth, and shining, of an amber-brown colour; spire almost flat; whorls 5, flattened, very slowly increasing in size, last not depressed, rounded at the base; suture strongly marked; aperture lunate; peristome simple, thin; columella dilated, concealing the slight perforation.

Diam., greatest 0·31, least 0·21; height 0·22 of an inch.

Hab. Wanga, San Christoval, Solomon Islands; on the mountains, under leaves (*Brazier*).

3. HELIX QUINTALÆ.

Shell imperforate, lenticular, greenish yellow, thin, transparent, flattened above; whorls 8, slowly increasing, the last sharply keeled, not descending in front, base rounded and excavated in the middle, irregularly rugosely striated above, smooth below the keel; suture shallow, but rather broad; aperture narrowly angularly lunate; peristome simple; columella scarcely dilated.

Diam., greatest 0·14, least 0·12; height 0·08 of an inch.

Hab. Norfolk Island; found in the pine-forests, under leaves in damp places (*Brazier*).

This species is closely allied to *H. lizardensis*, Pfr., and, at Mr. Brazier's request, is named in honour of Mr. Arthur Quintala, jun., of Norfolk Island.

4. HELIX HELVA.

Shell flattened, deeply and widely umbilicated, pale red, uniformly striated with coarse, regular, rather widely separated rib-like striæ; whorls 4½ to 5, rounded, the last descending gradually in front; aperture lunately rounded, margins joined by a dark callus; peristome obtuse, not reflected.

Diam., greatest 0·10, least 0·08; height 0·04 of an inch.

Hab. Aneiteum, New Hebrides; found under a log of wood (*Brazier*).

5. HELIX ARDUA.

Shell minutely umbilicated, turbinately globose, yellowish brown, thin, smooth, slightly shining; spire obtusely conical; whorls 6, markedly convex, the last not descending in front; base rounded; suture deep; aperture roundly lunate; peristome simple, somewhat expanded at the columella.

Diam., greatest 0·12, least 0·10; height 0·11 of an inch.

Hab. Erumanga, New Hebrides; found under a log of wood near the sea.

6. HELIX VANNÆ-LAVÆ.

Shell imperforate, conoidly depressed, dark yellowish horn-colour, smooth, shining; spire broadly conoid; whorls 5½, only slightly convex, last not descending, base convex; suture shallow; aperture

lunate; peristome thin, simple, columellar margin a little dilated above.

Diam., greatest 0·14, least 0·12; height 0·11 of an inch.

Hab. Aneiteum, New Hebrides; found under decaying leaves near the sea-shore (*Brazier*).

7. HELIX SORORIA.

Shell imperforate, depressedly globose, thin, smooth, shining, throughout light olive-yellow; spire slightly elevated; whorls 5, moderately convex, slowly increasing in size, last not descending in front, base rounded, narrowly margined at the suture; aperture ovately rounded; peristome simple, columellar margin only slightly dilated.

Diam., greatest 0·15, least 0·13; height 0·09 of an inch.

Hab. Ovalau, Fiji Islands; found under leaves on the mountains (*Brazier*).

8. HELIX SANSITUS.

Shell conical, narrowly umbilicated, regularly spirally striated, striæ slightly raised and granular, thin, light brown; spire raised and pointed; whorls 6, gradually increasing, the last sharply and prominently keeled, flattened at the base, which is also granularly spirally striated; peristome simple, thin.

Diam., greatest 0·11, least 0·10; height 0·09 of an inch.

Hab. Vanna Lava, Banks's Group; found inland, under decayed leaves in very wet places; also found at Viti Levu, Fiji, inland, in similar localities (*Brazier*).

9. HELIX EXAGITANS.

Shell plano-convex, flat above, convex below, deeply and openly umbilicated, pale brown-yellow, upper surface irregularly finely striated across the whorls; whorls 5, rapidly increasing, last not depressed in front, sharply keeled; peristome simple, thin.

Diam., greatest 0·09, least 0·06; height 0·04 of an inch.

Hab. Norfolk Island; found in damp places in the pine-forests, under leaves (*Brazier*).

10. HELIX TUTUILLÆ.

Shell depressedly conical, imperforate, of a dull pale brown, above finely granular, smooth and shining below; spire conical, obtuse; whorls 5, rounded, slowly increasing in size, last not depressed, not keeled, base rounded; suture broad and channelled; peristome thin, roundly lunate.

Diam., greatest 0·12, least 0·10; height 0·09 of an inch.

Hab. Tutuilla, Navigator's Islands; found in wet places, under leaves, near the sea (*Brazier*).

11. HELIX ANTELATA.

Shell depressedly conical, perforated, dull reddish brown, smooth;

spire obtuse, suture narrow, not excavated; whorls 5, last whorl inflated at the base, and excavated round the perforation; peristome simple, thin, columellar margin dilated at its insertion.

Diam., greatest 0·12, least 0·10; height 0·10 of an inch.

Hab. Aneiteum, New Hebrides; found under leaves near the sea (*Brazier*).

12. HELIX PATESCENS.

Shell imperforate, globosely depressed, thin, transparent, pale straw-coloured, shining, finely rugosely striated; spire conically raised; whorls 3½ to 4, the last rapidly increasing, much inflated at the base, and banded with a faint broad brown band; aperture oblique; peristome simple, thin, rounded.

Diam., greatest 0·16, least 0·12; height 0·12 of an inch.

Hab. Norfolk Island, under leaves in damp places (*Brazier*).

13. HELIX DEPSTA.

Deeply, rather widely, and openly umbilicated, discoid, thin, light yellowish brown; spire almost flat, suture well defined; whorls 4½, roughly arcuately striated above, much smoother below, slowly increasing in size, the last very slightly angled and a little depressed at its termination; aperture oblique, lunately rounded; peristome simple, not thickened, columellar margin not expanded.

Diam., greatest 0·23, least 0·19; height 0·13 of an inch.

Hab. Norfolk Island; under leaves in damp places (*Brazier*).

14. HELIX RETARDATA.

Shell deeply, openly, but narrowly umbilicated, thin, transparent, hyaline, pale horn-colour; apex of spire raised; whorls 5, gradually increasing, last not depressed, smooth and unsculptured; peristome lunately rounded, columellar margin a little dilated and reflected.

Diam., greatest 0·16, least 0·12; height 0·12 of an inch.

Hab. Aneiteum, New Hebrides; found under dead leaves near to the sea-shore (*Brazier*).

15. DIPLOMMATINA WISEMANI.

Shell sinistral, callously rimate, elongately oval, pupiform, light yellowish brown; apex acute; whorls 5, very finely obliquely, closely, and regularly costulate, third and fourth becoming rapidly tumidly enlarged, last contracted and subascendent; aperture subcircular, much expanded, thick, shining, and porcellaneous; margins joined by a thick expanded callus.

Breadth 0·05, height 0·11 of an inch.

Hab. Wanga, San Christoval, Solomon Isles (*Brazier*); found on the mountains, in damp places, under leaves.

Named, by Mr. Brazier's request, after Commodore Wiseman.

16. DIPLOMMATINA BRAZIERI.

Shell rimate, cylindrically acuminate, of a dull white colour; spire

acute; whorls 6½, regularly increasing, crossed by rather prominent, straight, widely separated ribs, the last contracted and ascendent; aperture ovately circular, thick, callous, and shining; margins formed by a thick callus continuous with the aperture.

Breadth 0·04, height 0·08 of an inch.

Hab. Wanga, San Christoval, Solomon Islands; found on the mountains, in damp places (*Brazier*).

17. CYCLOSTOMA BRAZIERI.

Shell pyramidal; spire acute and elevated, apex rose-red; whorls 5, round, under the lens very faintly spirally striated, dark cinnamon-colour; suture deep; umbilicus deep and narrow; aperture circular; peristome plain, scarcely thickened. Operculum solid, very concave outwardly, with prominent circular ridges.

Breadth 0·13, height 0·16.

Hab. Upolu, Navigator's Islands; found on the mountains, under decaying logs (*Brazier*).

10. Note on a Freshwater Fish from the Neighbourhood of Aden. By Lieut.-Col. PLAYFAIR, F.Z.S., H.M. Consul-General in Algeria.

I am indebted to the kindness of my successor at Aden, Captain Goodfellow, for several specimens of a Cyprinoid fish recently discovered in South Arabia.

During all the years I resided there I never heard of its existence, and I was fully convinced that the streams of that region, which are almost if not entirely dry in summer, and which even in the cold season are lost in the sand before reaching the sea, were destitute of fishes.

Not long ago the Sultan of Lahej, whose territories touch Aden, and of which, indeed, the latter once formed a part, sent to the Political Resident a jar of fishes, which he had caught in one of his streams, and which he suggested should be put into the ancient reservoirs, recently restored, and then full of rain-water.

This was done, and in a very short time the fishes increased both in number and size; and it is of these that Capt. Goodfellow forwarded the specimens before mentioned.

I was at first inclined to regard it as a new species of *Discognathus*, chiefly from the fact that it has four and a half series of scales between the lateral line and the root of the ventral fin, whereas the only other known species nearly resembling it had but two or two and a half.

My friend Dr. Günther, however, who has compared it with numerous specimens of *D. lamta* in the National collection from various localities between Nepaul and Palestine, has no doubt that it is referable to that remarkable species.

The following is a description of the specimens :—

Height of body considerably more than length of head, which is one-fifth of the total length without caudal. Head depressed; its width is five-sixths of its length; eye very small; interorbital space half the length of the head; width of mouth less than that of interorbital space; labial disk well developed.

Barbels four in number, the upper nearly double the diameter of the eye. *Four and a half longitudinal series of scales between the lateral line and the root of the ventral.*

Pectoral as long as head, terminating at about its own length before root of ventral. Caudal deeply emarginate, lobes equal.

Colour silvery, darker above; a black spot behind upper end of gill-opening; tip of snout blackish; no lateral band; no darker spot at base of caudal.

Length 5 inches.

February 10, 1870.

John Gould, Esq., F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to the following additions to the Menagerie during the month of January :—

1. A specimen of the Great Northern Diver (*Colymbus glacialis*), captured in Cornwall, and presented to the Society by A. R. Hunt, Esq., January 6th. The bird, which was believed to be the first specimen of the species ever obtained by the Society alive, had been rather shy at first, but had been gradually induced to feed, and now seemed likely to do well. It appeared to be a bird of the year.

2. A small Armadillo, purchased January 15th of Mr. E. Paddison. This Armadillo, which Mr. Sclater referred with some doubt to the Little Armadillo (*Dasypus minutus*), was stated to have been captured on the eastern slope of the Andes of La Plata, at an elevation of 3000 feet, in 35° 15′ S. lat.

3. Five Brown Tritons (*Geotriton fuscus*), from the vicinity of Spezia in Italy, purchased January 22nd, and believed to be the first specimens of this Batrachian exhibited in the Society's collection.

4. A female Potto (*Perodicticus potto*), purchased January 24th, making a pair of this scarce Lemurine form now living in the Society's collection.

The Secretary likewise reported that Mr. G. S. Rodon had presented to the Society the survivor of the two White-handed Gibbons (*Hylobates lar*) which he had deposited in the Society's Gardens on the 17th of November last—and that since the death of its fellow this animal had been placed in the same cage as the Hoolock Gibbon (*Hylobates hoolock*), presented by Mr. Grote, so that the two species might now be seen and compared together. A drawing (Plate V.) was exhibited, representing these two animals.

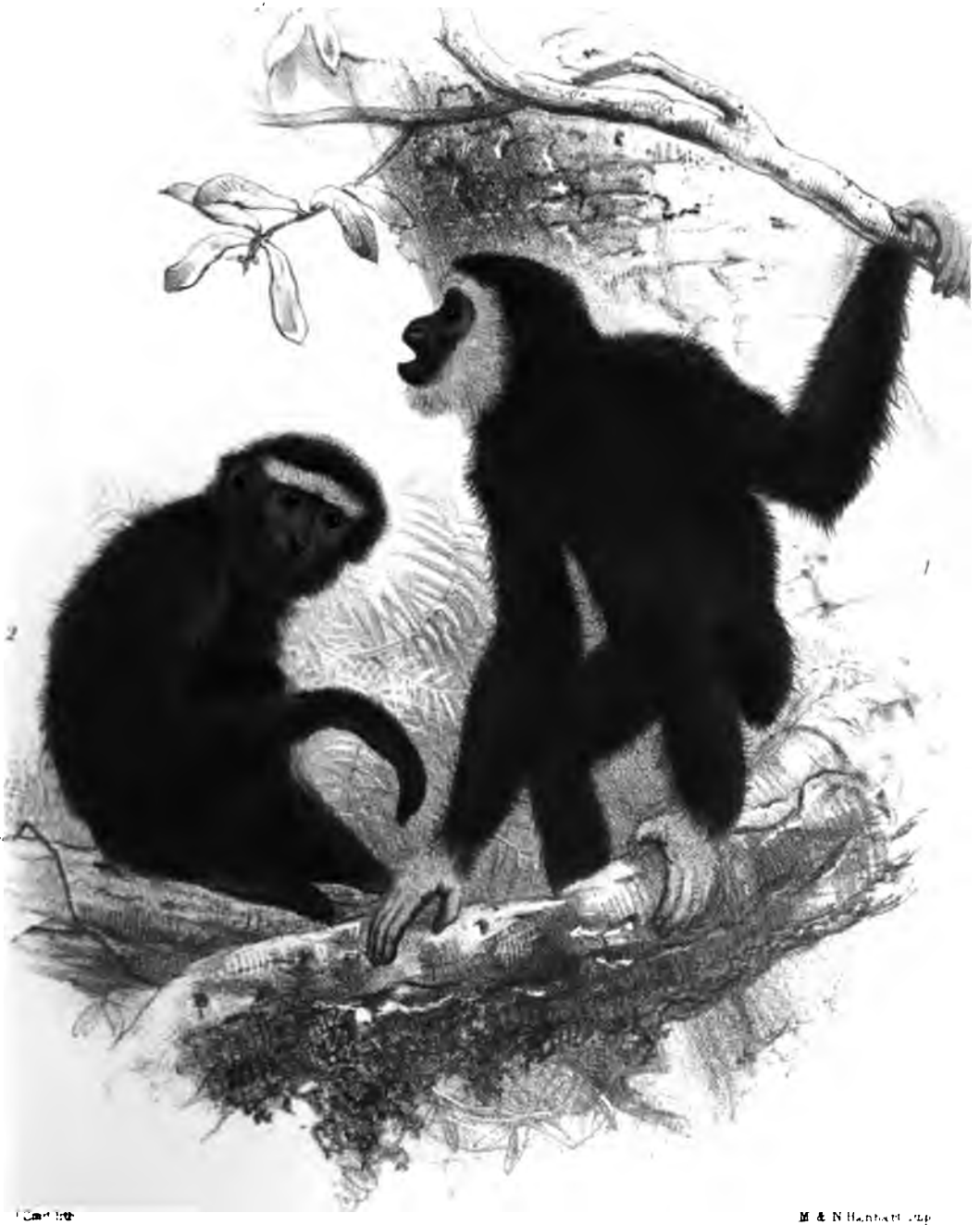


Fig 1. HYLOBATES LAR
2 ___ HOOLOCK

The following letter, addressed to the Secretary by Mr. William H. Hudson*, was read:—

"Buenos Ayres, Dec. 14, 1869.

"My dear Sir,—Probably I shall not be able to send any more birds to the Smithsonian Institution. The specimens I may find leisure to collect can be disposed of in Buenos Ayres; but should I meet with any thing new I will forward it to the Zoological Society of London. I was well pleased with your favour of November 9th, expressing your desire to see my notes on the birds I have collected; and should this letter and others I shall shortly send contain any thing of interest I shall be glad.

"Though the pampas of this part of the republic are all but entirely bare of trees, the swampy margins of the Rio de la Plata are covered with an almost impenetrable thicket from two to four miles in width. In this wood neither the thorny *Curumamnel* nor the gigantic *Ambu*, that flourish on the open plains, are found; but its trees and shrubs and many of its herbs are natives of the northern states of La Plata, the Chaco, and Paraguay. The seeds have been brought from those countries by the river, or on the *Camalote*—a species of water-lily that grows round the islands of the Parana and its tributaries. These plants accumulate on the water year by year till they form vast floating islands, and are ultimately torn from their moorings by the floods, carried hundreds of miles down the river, and stranded on its low shores. These migratory islands bring with them not only the seeds of northern vegetation, but colonies of insects, reptiles, and other animals. I have known the *Cierno*, *Jaguar*, *Aquará*, and *Carpincho*, and other large mammals, also large Serpents and Alligators, to have been thus brought down and landed within a few miles of the city of Buenos Ayres. Such large animals soon disappear; but smaller ones remain, so that in this forest Snakes and Batrachians are found of different species from those of the neighbouring plains—also insects, whose great size and gaudy colours prove their northern origin. The reptiles maintain their existence apparently within narrow limits; but many of the insects (particularly the Lepidoptera) become widely distributed, and show, by the dimmer colours and diminished size of many individuals, the modifying influences of climate and other physical conditions. The strips of vegetation stretching so far into this country from the northern wooded regions have also greatly promoted the distribution of birds.

"There are but a very few species of true 'Pampas-birds.' This name I apply to *Anthus correndera*, *Centrites niger*, the Red-breasted Lark (*Tæniоptera*), and all those kinds especially adapted to the conditions of the Pampa. These species avoid trees, and find their subsistence, roost, and breed on the ground. But the woody fringe to the river above mentioned has served as a grand highway by which most of our small birds have been introduced into this country.

* See articles by Messrs. Sclater and Salvin on Mr. Hudson's collections (P. Z. S. 1868, p. 137, 1869, p. 158 and p. 631), and Mr. Hudson's letter (P. Z. S. 1869, p. 432).

Thus the nearer we approach to this wood the more numerous do these species become, while in the wood itself, narrow as it is, there are many species never met with elsewhere. Possibly as many as two-thirds of all the species inhabiting Buenos Ayres are to be found within its limits.

"I obtained here many specimens of the Cuckoo to which you have called my attention (*Coccyzus cinereus*). This bird was originally discovered in Paraguay, and is considered by Dr. Burmeister to be a rare species. Perhaps it has but recently found its way to this country. Last summer (1868) I met with it for the first time; and the same year the first and only specimen ever in the museum of this city was obtained. Even within my recollection many birds and insects once seldom met with have become common. Some of our large Wasps, Weevils, and Butterflies have not been with us long; and whole orchards are at present being destroyed by the Capricorn Beetle—an insect totally unknown a few years ago.

"To return to the *Coccyzus cinereus*; the large blood-red eye of this bird, contrasting well with the soft bluish colour of the plumage, gives it a most interesting appearance. I have not yet succeeded in finding its nest. Like the common Cuckoo, it is retiring in its habits, concealing itself in the densest foliage; but it cannot be attracted like the other species by mimicking its call. It has a song (which it will sometimes repeat at short intervals for half a day) like the mourning of our little Dove, being a succession of long and plaintive notes. It has, besides, a different note—loud, harsh, and sudden, so much resembling the cry of another bird (the *Anabates lophotes*) that I have been frequently deceived by it.

"The last-mentioned bird is, I think, very uncommon in this region. The only specimen in the museum here was brought from the province of San Luis. It has the wildest disposition and greatest love of concealment, of any bird I have ever met.

"Last summer, while trying to obtain specimens, I sometimes heard the cry of an individual repeated at long intervals, or of a pair answering each other, and I frequently spent half a day vainly in watching for and pursuing them. Once only I succeeded in getting a glimpse of one at the moment it started screaming from a tree. I was, fortunately, able to secure it, and have it still in my collection. This specimen was a male; the whole plumage a yellowish brown, rather deeper than that of the Oven-bird (*Furnarius*). It is also somewhat larger than that bird. The body was stout, the head crested, the eyes were white and small, bill and legs blue. The tail-feathers were stiff, like those of the Woodpecker, and frayed at the ends, as if they had been used in the same manner; the bill was also, like the Woodpecker's, hard, sharp, and straight.

"Another bird of very interesting habits, and never seen away from the river-wood, is *Icterus pyrrhopterus*. They appear in small flocks in September, but soon scatter, and are seen during summer in pairs or singly. The male is considerably larger than the female, its colour an intenser black, the brown spot on the shoulder larger. It is exceedingly restless, incessantly flying from tree to tree, cling-



J.Wolf del.
J.Smit lith.

M & N. Hanhart imp.

HYDROPOTES INERMIS.



Fig 1.



Fig 2.

J.Smit lith.

M & N Hanhart imp.

HYDROPOTES INERMIS

ing to the boles or branches in various attitudes, and searching with its hard curved bill for insects under the decayed bark. When thus engaged it utters a great variety of chirps and guttural sounds, interspersed with short agreeable notes. It has also a continuous song, low and varied, with a peculiar ventriloquism in some notes which gives the listener a confused idea that the performer approaches and retires when singing. The first bird of this species I shot was but slightly wounded in the wing, and fell into a stream; to my great surprise it began singing as it floated about on the surface of the water, and even when I had taken it out continued to sing at intervals in my hand. I subsequently found a nest of this bird; it was about 7 inches deep, composed entirely of lichens curiously woven together, and suspended from the twigs of a low tree. The male and female fluttered round me, manifesting great anxiety (though there were no eggs in the nest), and uttering a rapid succession of notes, very different from their usual song. But what was most surprising in this singing to express their trouble was the close resemblance of every note to those of some other bird, generally of one of our common songsters (such as *Turdus rufiventris*, *Mimus calandria*, and others). In a few days I returned to the spot to secure the nest and observe them again, but found, to my sorrow, nest and birds had disappeared. Perhaps *Icterus pyrrhopterus* possesses the faculty of imitation; at the time I heard this pair I thought it could not be otherwise, but I have not observed them long enough to be positive. Certainly they are incapable of expressing their passions by harsh or loud notes.

"I am, Sir, truly yours,

"WILLIAM H. HUDSON."

The following papers were read:—

1. On a new Deer from China.

By R. SWINHOE, F.Z.S.

(Plates VI. & VII.)

While in Formosa I was informed by a gentleman there, who had lived at the port of Chinkiang, that a Hog-backed Deer, with coarse hair, was common on an island in the river Yangtsze and afforded excellent sport to the European residents during the winter. From my friend's description, I supposed the animal to be *Hyelaphus porcinus* of India, and communicated the fact to Mr. P. L. Sclater, who read my notice to this Society on the 27th June, 1865 (see P. Z. S. 1865, p. 510). Last winter I had the opportunity of visiting Shanghai, and found this so-called Hog-deer in the market, and then saw it to be quite a distinct species, without horns, and of great interest. I have brought home with me the skin and skull of a buck, and the skulls of two does. These I beg to exhibit to this Meeting, and to propose for this new Deer the specific term of *inermis*, from its hornless state, and to place it under a new genus, for which

I would suggest the name *Hydropotes*, or Water-drinker, from the love of the animal for marshy ground.

HYDROPOTES, gen. nov.

General form of skull very similar to that of *Moschus*—there being no elevated ridges along the supraorbital margin, and the brain-case being narrow and somewhat elongate. *Lachrymal fossa* small, entirely confined to the lachrymal bone, the maxillary not participating in its formation. *Supraorbital foramen* situated in a groove extending further backwards than forwards, as in *Cervulus*. No prolongation of the frontal bones whatever.

The nearest allies to this genus are, as far as the cranial characters are concerned, *Pudu humilis*, of Chili, and *Moschus moschiferus*, L., of N.E. Asia. The Pudu has got a much larger and deeper lachrymal fossa, in which the maxillary participates; the distance of the lachrymal fossa from the *foramen supramaxillare* is much less than the length of the lachrymal fossa, whilst in this new genus the distance is much greater.

The affinity of this genus to *Moschus*, is shown by the fact that *Moschus* has no *lachrymal* fossa whatever—a character so general in the Deer group.

Upper canine teeth, in the male, tusk-like, as in *Moschus*, but not so developed; in the female quite small.

Incisors on the lower jaw eight, the two centrals large and flattened, the three lateral on each side smaller, graduating in size outwardly; all arranged in fan-form.

Molars unfortunately not fully developed in any of my skulls, though the animals were capable of breeding at this age.

The *crania* of the females are smaller, but show no peculiarities, except in the undeveloped nature of the canine teeth above noticed.

Hair coarse and stiff, combining the characters of *Moschus* and *Pudu*, as also do the *feet*.

HYDROPOTES INERMIS, sp. nov. (Plate VI.)

Measurements taken from the stuffed skin of an animal about three-quarters grown:—Length from nose to rump 29 inches, of tail 3, of fore leg from shoulder 18, of hind leg 20, across the eye ·7, across the nose ·7; length of head 6·75, of ear 3½, of canine tooth 1·1.

General colour light chestnut, stippled with black, redder on the head and back of ears. Round the nose, eyebrow, chin, and throat pure white. Inside of ear light buff, whiter near base; its outer edge, at tip, black. Neck paler, its under portion plain-coloured. Shoulder, fore and hind legs, and tail light brownish chestnut. Belly pale buff-white. The chestnut colouring of the upper parts deepens along the back and pales downwards on the sides.

The hair of the nasal region very short. At the corner of the lower lip springs a tuft of stiff white hairs. Bristles about the muzzle short and few. Eye small. Ears well clothed inside. Hair coarse and stiff, of the neck and rump the longest. Each hair of

the upper body is flattened, and undulates from side to side, or is zigzag in its length, giving it in some veiws quite a spiral appearance. I notice the same peculiarity in the corresponding hair of the *Moschus*. Each of these hairs in our animal is white from its base for the greater part of its length, then blackish brown, ending with a light chestnut tip; thus, the hairs overlapping each other, the chestnut tips give the general ground-colour, and the blackish rings the stippling.

Fore leg. Length of hoof in front 1·25, breadth of each segment ·75; length of hind toe ·75, its breadth ·45, raised about ·75 above the sole of the foot.

Hind leg. Length of hoof 1·18, breadth of each segment ·63; length of hind toe ·60, its breadth ·45, raised above sole of foot 1·30.

The above description is taken from a buck bought in the market at Shanghai on the 30th November 1868, and consequently in its winter coat.

In coloration and outward appearance the little *Pudu* comes much nearer to our species than does the bristly-looking brown *Moschus*. It is also chestnut-coloured, stippled with black and red on the head and ears; but its rump and tail are red (which are not so in our animal), and the male carries horns. Dr. Günther has kindly assisted me in working out the affinities of this animal.

In the large riverine islands of the Yangtsze above Chinkiang these animals occur in large numbers, living among the tall rushes that are there grown for thatching and other purposes. The rushes are cut down in the spring; and the Deer then swim away to the main shore and retire to the cover of the hills. In autumn, after the floods, when the rushes are again grown, they return with their young and stay the winter through. They are said to feed on the rush-sprouts and coarse grasses, and they doubtless often finish off with a dessert from the sweet-potatoes, cabbages, &c. which the villagers cultivate on the islands during winter. They cannot, however, do much damage to the latter, or they would not be suffered to exist in such numbers as they do; for the islands have their villages and a pretty numerous agricultural population. Fortunately for the Deer, the Chinese have an extraordinary dislike for their flesh. I could not ascertain why; but it must be from some strange superstition, as the Celestials are otherwise pretty nearly omnivorous. The Deer are killed only for the European markets, and sold at a low price. Their venison is coarse and without much taste, but is considered tolerable for want of better; it is the only venison procurable in Shanghai. The animal itself gives sport to the gunner; and numbers are slaughtered every winter by the European followers of Nimrod, in the name of *sport*. Their numbers, however, do not appear to get much thinned; they are reported to be very prolific breeders. A friend of mine assured me that he witnessed the gutting of a female that was shot by one of his party on a late excursion, and that she was found to contain *six* embryo young. This single fact, however, is not sufficient to establish the ordinary gestation of this species; on the contrary, it was probably an extraordinary case; but it was the only

instance I could get of a pregnant specimen having been examined. The large number of immature animals usually seen in a herd of them seems to show that they have some means of reproducing not common to other Deer.

On my cruise up the river Yangtsze with Admiral Sir Henry Keppel last year in H.M.S. 'Salamis,' we called at Chinkiang, and, taking on board some of the residents at that port, steamed a few miles further up, and landed at Deer Island for a little shooting. A goodly party of officers and others were with us, and the Deer were well disturbed that day; no bullets were allowed, for fear of accidents, and only fowling-pieces used with large shot. A large patch of rushes still stood, and there were plenty of Deer; but only *eight* were brought back to the ship, though doubtless many more were injured. They crouch in the reeds and long grass, admitting pretty close approach, and then, rising with a bound, spring away. They were generally put up singly or in twos and threes. In running they cock their ears, round their fore legs, bend up their hind legs, hog their rumps, and scurry away with little quick leaps, very much after the manner of a Hare. The heavy shot soon bowled them over. When they ran across the cultivated fields, the Chinese shouted after them and set their barking curs to pursue them.

The Chinese at Shanghai call this animal the *Ke*; but at Chinkiang they are named *Chang*—the classical term for the Muntjac (*Cervulus reevesi*). The Chinese dictionary compiled under authority of the Emperor *Kanghe* describes the *Ke* as "Stag-like, with feet resembling those of a Dog, has a long tusk on each side of the mouth, and is fond of fighting."

EXPLANATION OF THE PLATES.

PLATE VI.

Hydropotes inermis.

PLATE VII.

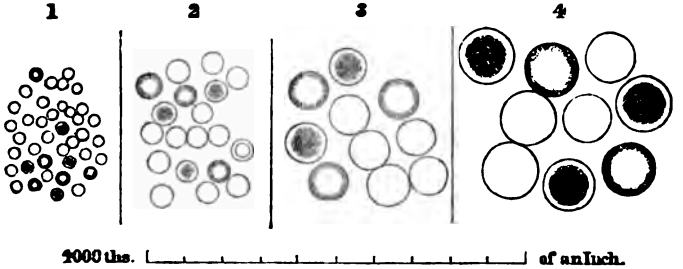
Fig. 1. Skull of male *Hydropotes inermis.*
2. Skull of female *Hydropotes inermis.*

2. On the Size of the Red Corpuscles of the Blood of *Moschus, Tragulus, Orycteropus, Ailurus,* and some other Mammalia, with Historical Notices. By GEORGE GULLIVER, F.R.S.

Measurements, Scale, and Woodcut.—The present, like all my former measurements, are given in vulgar fractions of an English inch. Of the scale to the woodcut each division of one-fifth of an inch is equivalent to one four-thousandth of an inch micrometrical or linear admeasurement, being the same scale as that to which the figures are engraved in the reports of my lectures, in the 'Medical

Times and Gazette' from August 1862 to December 1863, and in the 'Proceedings' of this Society for February 25, 1862.

In the subjoined woodcut are represented dried red blood-disks of four Mammalia, to wit:—1. *Tragulus javanicus*; 2. *Moschus moschiferus*; 3. *Cervus alces*; 4. *Orycteropus capensis*. Figures 1 and 4 show specimens of the smallest and largest of these corpuscles yet known among Mammalia; and figures 1, 2, and 3 some marked differences in the size of the corpuscles of Ruminantia.



Red Blood-Corpuscles.

Fig. 1. *Tragulus javanicus.*
2. *Moschus moschiferus.*
Fig. 3. *Cervus alces.*
4. *Orycteropus capensis.*

Moschus moschiferus.—Through the courtesy of Professor Flower, I have examined the blood of the female of this species that died at the Zoological Gardens on the 26th of October, 1869; and the result affords an interesting complement to or illustration of my original observations on the blood-disks of Tragulidæ and some other Ruminants. Their mean size in *Cervus alces* is $\frac{1}{3938}$ of an inch.

Of the blood-disks of ***Moschus moschiferus***, the report to him of my examination was to the effect that this species appeared to be no near relation to those three "Musk-deer" of which I had formerly examined the blood, that *M. moschiferus* could hardly belong to the same genus as that which includes those three species, and that there was no appreciable difference of size between the blood-disks of *M. moschiferus* and those of *Cervus nemorivagus*.

From thirty-one measurements of the red blood-corpuscles of ***Moschus moschiferus*** their average diameter was found to be $\frac{1}{7060}$ of an inch; and an independent measurement by Professor Flower and Mr. Moseley made them closely of the same size. The extreme sizes observed by me were $\frac{1}{8888}$ and $\frac{1}{5333}$ of an inch. And thus, with this animal, the Ibex, Brocket-deer, and *Tragulus*, my observations show that we have three or four genera at present known with blood-disks smaller than those of the Goat.

Though these corpuscles of ***Moschus moschiferus*** are so small as at once to declare the Ruminant order to which this animal belongs, they may be seen at a glance to be at least a third larger than those of *Tragulus*, and little more than half the size of the blood-disks of *Cervus alces*. And how close is the correspondence in this respect

between these corpuscles of *Moschus moschiferus* and those of *Cervus nemorivagus* will appear by a comparison of fig. 2 in the above woodcut with fig. 7 in the 'Proceedings' of the Zoological Society above cited. In *M. moschiferus* none of the blood-corpuscles presented those curious and irregular shapes which I have described and figured in certain Cervidæ (Lond. and Edin. Phil. Mag. Nov. 1840, and Proc. Zool. Soc. Feb. 25, 1862, fig. 7).

Tragulus.—The average diameter of the blood-disks of *T. javanicus* and *T. meminna* is $\frac{1}{12,325}$ of an inch, and the extreme sizes $\frac{1}{16,000}$ and $\frac{1}{9000}$ of an inch; and of *T. stanleyanus* the average size of the corpuscles is $\frac{1}{10,825}$ of an inch. These measurements of the smallest known blood-disks of Mammalia are here quoted from my Tables for comparison.

Orycteropus capensis.—Not long after the death of the true Musk-deer died an *Orycteropus* and *Ailurus*; and I am also indebted to Prof. Flower for an opportunity of examining the blood of these two animals. We made a cursory examination together of their blood-disks, and easily saw that those of *Orypteropus* were much the largest. But the power of the instrument then used was insufficient, and I completed the examination at home.

After my discovery of the large size of the red blood-corpuscles of *Myrmecophaga* and *Bradypus* (Proc. Zool. Soc. June 11, 1844, and Jan. 24, 1854), the similar magnitude of the corresponding corpuscles of *Orycteropus* was expected; and they are certainly among the largest known in Mammalia. From many measurements the average diameter of the red blood-corpuscles of *Orycteropus capensis* proves to be no less than $\frac{1}{2765}$ of an inch, with many gradations between the few two extremes of one-third smaller and one-third larger than the average size. Such varieties of size are common in the blood-disks of single species throughout the Vertebrate subkingdom. The red blood-corpuscles of *Orycteropus* are so nearly of the same size as those of the Elephant and *Myremecophaga* that it would be difficult to distinguish these three animals by their blood-disks, as will appear by comparing fig. 4 of the above woodcut with figs. 6 and 9 in the Proceedings of the Zoological Society for Feb. 25, 1862.

Ailurus fulgens.—The average size of the blood-disks is $\frac{1}{3764}$ of an inch, thus nearly corresponding with those of *Procyon*, *Nasua*, and *Meles*; but its next neighbour, *Cercoleptes*, in the zoological systems, has blood-disks so much smaller as to indicate that it may be but an aberrant member of that family which includes *Ailurus*.

Import and Relations of the Size of the red Blood-corpuscles.—Previously to my researches it was commonly said, after Hewson, that the size of the blood-disks has no relation to that of the species—and truly, if regard be had only to such different animals as the Mouse and Horse. But my measurements clearly proved that there is so far such a relation in Mammalia of one natural order or family that the smallest blood-disks occur in the small species and the largest blood-disks in the large species of that order or family. Among Rodents, *e. g.*, I discovered the largest blood-disks in the great

Capybara, and the smallest in the tiny Harvest-mouse; while in the whole class of Birds the rule in this respect, in conformity with the comparative uniformity of their general organization, proved to be like that rule for a single order of Mammalia. On the contrary, with such greater divergences of general organization as occur in Reptiles and Fishes there are corresponding diversities in the blood-disks.

And the present observations conform to this view as to the size of the red blood-corpuscles in a mammalian order. Among Ruminants the woodcut shows these corpuscles smallest in the diminutive *Tragulus*, larger but still small in the bigger *Moschus*, with much increase of size in the great Moose-deer. And they are largest of all in the biggest Edentata, so that this order is now proved to be characterized by larger blood-disks than have yet been found in as many different genera of any other order of Mammalia.

In many species of different orders there may be such a near approximation in the size of the corpuscles as to make them worthless as diagnostics between one order and another. For example, some of the larger Ruminants could not be distinguished by this character from several *Feræ*. In the Seal, indeed, these corpuscles are about the same size as in Man, and only slightly smaller in the Otter and Dogs; but in the *Paradoxures* and *Viverras* the blood-disks are not larger than in the Wapiti, Elk, and Sambur Deer, and in the Aurochs and other Oxen.

But in closely allied and true members of a single natural family the characters of the blood-disks, as already shown, may afford an excellent diagnostic between that and another family. In such a family the blood-disks are so much alike that their size, *cæteris paribus*, is only largest among the big species and smallest among the little species. Shortly after the discovery by M. Mandl of the oval shape of the red blood-corpuscles of the Dromedary and Paco, I confirmed it, and discovered that these corpuscles have the same shape in all the other members of this family—also that, notwithstanding the oval figure of these blood-disks, they resemble those of other Ruminants in structure and size, and by no means approach in either of these respects to the oval corpuscles of pyrenæmatous vertebrates (Med. Chir. Trans. Nov. 26, 1839, vol. xxiii.).

But when the blood-disks of one species differ remarkably in size from those of several other species of a single natural family, that species, *cæteris paribus*, is likely to be an aberrant one in its general organization. All my observations support this view, as is exemplified by *Hyrax capensis*, *Bassaris astuta*, *Cercoleptes caudivolvulus*, and other Mammalia. And we have already seen that *Moschus*, if still included with *Tragulus*, would be an equally remarkable instance. Again, my discovery of the singular minuteness of the blood-disks of Tragulidæ would indicate that this is really a distinct natural family, though I know not that we have any other group of equally small Ruminants for comparison.

The opinion that the size of the blood-disks is connected with the kind of food on which the animal lives has never been confirmed.

This is one of Professor Owen's views,—a "generalization" from a preposterous insufficiency of observations. After informing us that the rule is generally applicable to the placental and marsupial Mammalia, he adds that, "the blood-disks of the marsupial species which derives its nourishment from the greatest variety of organized substances, as the *Perameles*, which subsists on insects, worms, and the farinaceous and succulent vegetables, are larger than those of the (Spotted) carnivorous Dasyure, and those of the herbivorous Kangaroo, the blood-disks of the latter, like those of the placental Ruminant, being the smallest" (Lond. Med. Gazette, Dec. 20, 1839, p. 475). How completely this view is at variance with the facts may be seen in my Tables of Measurements, of which he sometimes quotes the French translation by Prof. Milne-Edwards. The blood-disks are largest of all in the Elephant, a purely vegetable feeder, and in the Edentates, which do not subsist on the greatest variety of organized substances; while among Marsupials there are some species living on one kind of food, the Ursine Dasyure, *e.g.*, that have larger blood-disks than those of the more omnivorous *Perameles*. They are larger in the piscivorous Seals and Otter than in the Pig, an animal well known to subsist on quite as great a variety of organized substances as the *Perameles*; while the blood-disks of the Pig are not larger than those of the Tapir, Rhinoceros, and Ass, three other Pachyderms and well-known vegetable feeders. And similar examples are afforded by Birds and lower Vertebrates.

No wonder, then, that a writer entertaining such opinions as to the food and blood-disks should embrace the additional error that their gradations of size are "insignificant" or "unimportant."

But, notwithstanding his conclusions, the truth is that this question of size is both significant and important. In systematic zoology we have already seen that the size of the corpuscles frequently affords a good diagnostic, both of one order from another and between genera or species of a single order or family; as I have more fully shown in the Appendix to Gerber's 'Anatomy,' in the Notes to Hewson's Works, in various numbers of the 'Philosophical Magazine' from 1839–42, in the second volume of the 'Journal of Anatomy,' and still further in the 'Proceedings' of the Zoological Society—with illustrative engravings in the volume for 1862 (p. 91), and in the 'Medical Times and Gazette' from August 1862 to December 1863. And in a physiological point of view the size of the blood-disks is still more important and significant in relation to respiration and animal heat, as described in Lecture IX., reported in the 'Medical Times and Gazette' for January 17, 1863, and in the abstract of another of my lectures in 'Scientific Opinion' for December 8, 1869.

Indeed a field of experimental inquiry is thus opened which will surely yield a rich harvest when properly cultivated. What, for example, is the precise relation of animal heat to the proportion of the whole blood to the body? What is the relation of that heat to the proportionate quantity or aggregate bulk of the blood-disks to the other parts of the blood? How far is the animal heat affected, *cæteris paribus*, by the size of the blood-disks? I know of no exact

experiments relating to these points, save the few valuable but fragmentary ones of that eminent physiologist the late John Davy. In short, the relation of animal heat to the size and proportion of the red corpuscles of the blood still requires an ample and careful set of experiments. From all that is at present known it appears that, *cæteris paribus*, the smaller these corpuscles the greater will be the heat of the animal, since a minute subdivision of a given bulk of them will afford a corresponding increase of their aggregate surface for the transit of oxygen. The comparative smallness of the blood-disks of the diminutive species of a family of Mammals and of the class of Birds may be a provision against the greater proportionate loss of heat in the little members of such family or class.

Dr. Davy has shown that warm-blooded fishes have a large proportion of blood and red corpuscles, while that proportion is remarkably less in fishes that are but little warmer than the water in which they live. And to this excellent observer we are indebted for precise experiments on the increase of the heat in Man when the circulation of the blood is hastened through the lungs and body. The warmth of the Python during incubation at the Society's Gardens, as shown by the important observations of Dr. Sclater (Proc. Zool. Soc. 1862, p. 365), was probably due to accelerated circulation of the blood, and increased chemical action connected therewith, as in a fever. In one of his interesting experiments, Dr. Sclater found the temperature of the female Python as high as 96°, and of her male mate 76°, while the air of their den was only 60°. Such facts, with Dr. Davy's discovery of the regular warmth of certain Fishes, as much invalidate Prof. Owen's distinction of "Hæmatocrya" and "Hæmatotherma," as, according to his statement, the air-cavity of the humerus of the Pterodactyle "breaks down" Cuvier's distinction of Birds from Lizards by the air-passages in the bones.

Historical Notices.—The records of discovery concerning the constituents and properties of the blood make but a sorry chapter in its written history, and one, indeed, that had better remained unwritten than overwhelmed, as it was, with confusion and injustice. In the Introduction and Notes to Hewson's works, it was part of my duty to correct Prof. Owen's contributions to such mistakes; and I now regret that the common truth of a branch of physiological history and my own just claims still require vindication from his pretensions and the indiscreet zeal of his friends.

The early tables of measurements by Prevost, Dumas, or others, exemplified the smallness of the blood-disks of Ruminants in those of the Sheep, Goat, or other members of the order. And the red blood-corpuscles of the Goat were the smallest known before my discovery, read at the Med. Chir. Soc. Nov. 26, 1839, of their singular minuteness in *Tragulus*; while my measurements thereof, and of the blood-disks of the Camels and several other Ruminants, and of the Marsupials, were, as then noted by the Editor, communicated to the 'Philosophical Magazine' just three days previously. Yet these plain truths are always suppressed by Prof. Owen in order to support his own pretensions to the discovery and his amusing

declaration that "This generalization has not been affected by later observations."

He does not scruple to borrow without acknowledgment from my Tables of Measurements (Comp. An. ii. 184); though hinting more than once that they are "insignificant" or "unimportant," and this under cover of references to the French translation of them by Milne-Edwards and not to my own original version.

Indeed, to this illustrious physiologist Prof. Owen refers on this question, as both Milne-Edwards and his son Alphonse Milne-Edwards have been moved to make the emphatic assertion that the minuteness of the blood-disks of *Tragulus* was discovered by Prof. Owen. But this is a misstatement, as the very reference made in its behalf, to the 'London Medical Gazette,' 1839–40, will prove. A careful search throughout those volumes, not excepting the curious zoologico-anthropological characteristics in the "Extra Limites," vol. ii. p. 671*, will fail to find mention of more than a single *Tragulus*; and that occurs, with his first notice of the blood of Camels, in the number for December 20, 1839: all the few measurements in that paper were by Mr. Bowerbank; and "*Moschus pygmæus*" is the only *Tragulus* mentioned therein.

But, as Prof. Owen has long since well known, my observations on the minuteness of the blood-disks of *Tragulus*, on the shape and size of those of certain Camels, and on their structure in this whole family, were read, as before said, at a meeting of the Medico-Chirurgical Society on the 26th of November previously, published in the 23rd volume of the Transactions of that Society, and, with my description of the same corpuscles of Marsupials, in the 'Dublin Medical Press' of November 27, in the 'London and Edinburgh Philosophical Magazine' of December 1, all of the same year, and in several other periodical works either of the first day of December, or at least before the date of Prof. Owen's paper. And of his acquaintance with my paper that had been read at the Medico-Chirurgical Society on the 26th of November, he has left published proof in a footnote to his own paper of the succeeding 20th of December, in which he quotes mine of the preceding 26th of November as to the lymph-globules of *Tragulus* and the Camels, but omits any notice of my description therein of the blood-disks of those animals; only he says that the minuteness of the blood-disks of *Moschus pygmæus* is such as he "had anticipated;" and so, no doubt, he had, with my published proof of that minuteness before him.

In the foregoing notices an attempt has been made to assert the truth respecting a branch of physiological history to which the best part of my life has been devoted. Should it be supposed that I have now been influenced only by considerations personal to myself, I can but truly deny the imputation, and refer in proof to my published writings, in which quite as much zeal has been shown in defending the rights of Davies, Hewson, and others from unjust aggression as I have here exercised in behalf of my own just claims. Had private persons been the authors of the errors now corrected, they might have passed, like several similar ones, without notice; but Professor

Milne-Edwards is one of the most eminent comparative anatomists and physiologists in Europe, and Professor Owen is the Superintendent of the Natural-History Departments of the British Museum.

3. On the Freshwater Fishes of Burmah. By Francis Day, F.Z.S., F.L.S.—Part II.*

Ophiocephalus aurolineatus, sp. nov.

D. 53. P. 18. V. 6. A. 36. C. 14. L. l. 66. L. tr. $\frac{6\frac{1}{2}}{14}$.

Length of head nearly $\frac{1}{4}$, of caudal $\frac{2}{11}$, height of body $\frac{2}{13}$ of the total length.

Diameter of eyes $\frac{1}{8}$ of length of head, 1 diameter from end of snout, $1\frac{1}{2}$ diameter apart.

The posterior extremity of the maxilla extends to below the posterior margin of the orbit. Thirteen rows of scales between the orbit and the angle of the præopercle. Shields on top of head of moderate size.

Teeth numerous, villiform, in jaws, vomer, and palate.

Colour dark purplish black, with an orange stripe commencing at the snout and passing through the eye along the side and above the lateral line to the upper half of the tail.

Hab. One specimen, $3\frac{7}{10}$ inches, was taken at Moulmein. Although the natives asserted it to be a common species, a second specimen was not obtained. It may prove to be the young of the *O. marulius*, H. B., from which, however, it appears to differ considerably.

Labeo neilli, sp. nov.

B. iii. D. $\frac{2\text{-}3}{15\text{-}16}$. P. 15. V. 9. A. 2/5. C. 19. L. l. 34. L. tr. $\frac{5\frac{1}{2}}{6\frac{1}{2}}$.

Length of head nearly $\frac{1}{5}$, of caudal $\frac{1}{4}$, height of body $\frac{2}{7}$, of dorsal fin $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, 2 diameters apart.

Snout rounded and smooth, it scarcely overlaps the mouth, which is of moderate width; no lateral lobe; lips thin, only slightly reflected, they are both fringed with two, three, or more rows of well-developed papillæ internal to the outer fringe. The rostral barbels do not reach the orbit; the maxillary extend to beneath its centre. Body compressed.

Fins. The dorsal arises before the ventral, and much nearer the snout than the base of the caudal, which latter is deeply forked. Upper margin of dorsal slightly concave.

Teeth pharyngeal, 5, 4, 3/3, 4, 5, plough-shaped.

Scales. Four and a half rows between lateral line and the base of the ventral fin.

Gill-rakers very short.

* For Part I. see P. Z. S. 1869, p. 614.

Colours. Greyish yellow, darkest above, every scale having a dark spot at its base. Fins yellowish orange; dorsal darkest in its lower half, a darkish spot near the root of the caudal fin, and another, ill-defined one at the commencement of the lateral line.

Hab. Sittoung and Billing, whence I procured seven specimens up to six inches in length. I have named the species after my esteemed correspondent A. B. Neill, Esq., F.Z.S.

BARBUS (BARBODES) STEVENSONII, sp. nov.

B. iii. D. 3/9. P. 17. V. 9. A. 3/5. C. 19. L. l. 27. L. tr. 4½/5.

Length of head $\frac{2}{9}$, of caudal nearly $\frac{1}{4}$, height of body $\frac{2}{5}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, 1 diameter from end of snout, 1 diameter apart.

Body elongated, compressed. Dorsal profile but little elevated.

Interorbital space flat. Upper jaw longest. Maxillary barbels extending to below the posterior margin of the orbit; the rostral ones are shorter.

Fins. The dorsal arises before the ventral, and midway between the snout and the base of the caudal; its third undivided ray is smooth, weak, and articulated in its whole extent; the fin is slightly lower than the body. Caudal forked.

Scales. Two and a half rows between the lateral line and base of the ventral fin.

Colours. Silvery; a black spot at the base of the caudal.

Hab. Akyab. Given to me by Col. Stevenson amongst several other species; and I have named it after its discoverer.

BARBUS (PUNTIUS) PUNTIO, H. B.

B. iii. D. 3/8. P. 15. V. 9. A. 2/5. C. 21. L. l. 23. L. tr. 4/4.

Length of head $\frac{1}{4}$, of caudal $\frac{2}{7}$, height of body nearly $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $\frac{2}{3}$ of a diameter from end of snout, 1 diameter apart.

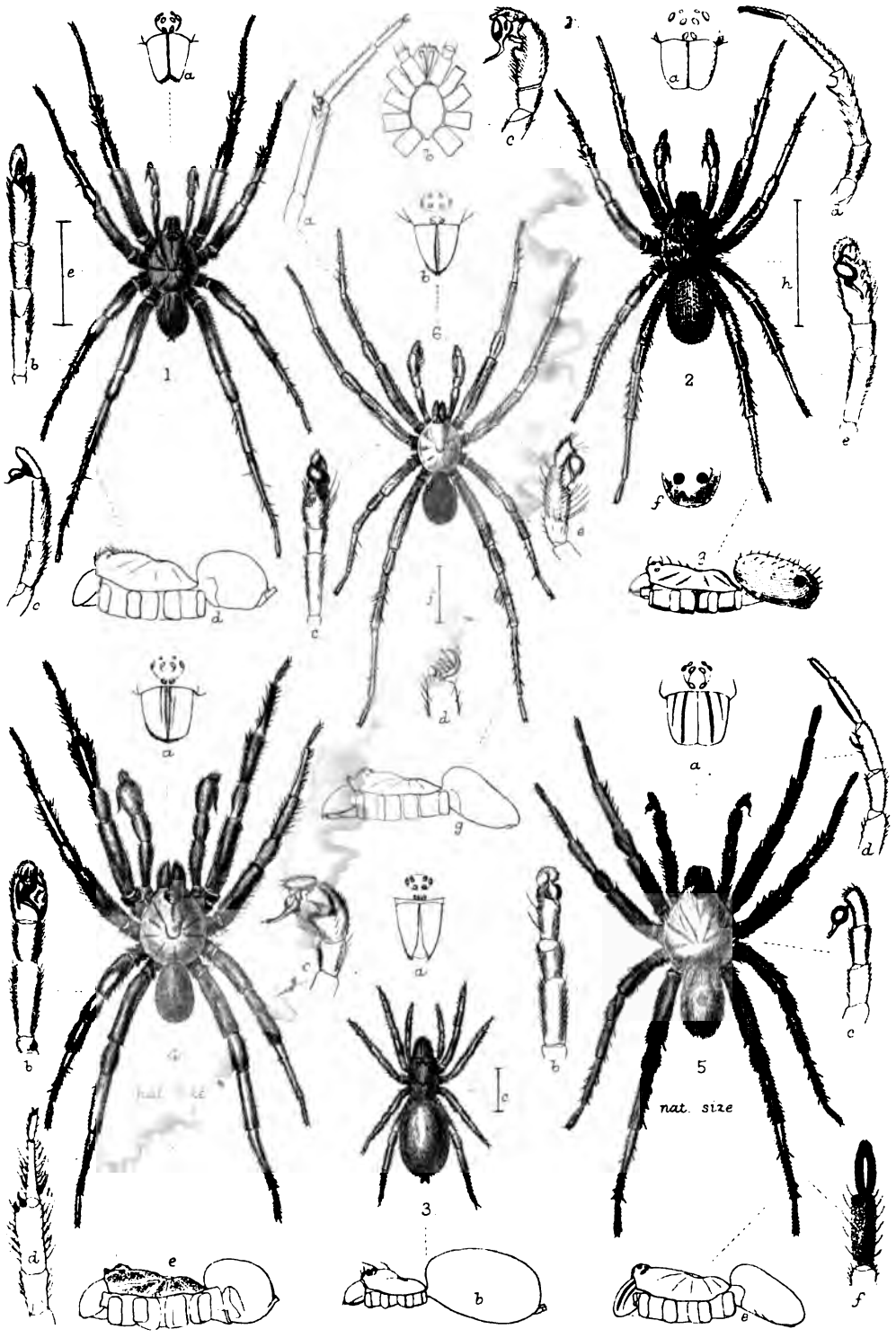
Mouth small, destitute of barbels. Dorsal profile rises to the origin of the dorsal fin.

Fins. Dorsal commencing midway between the anterior margin of the orbit and the base of the caudal, rather in advance of the ventrals; its third undivided ray is smooth, weak, and articulated. Caudal deeply forked.

Lateral line incomplete, only extending along a few scales. Two rows and a half of scales between it and the base of the ventral fin.

Colours. Silvery; a deep wide black band encircles the free portion of the tail, and includes the tip of the anal. Dorsal fin orange tipped with black.

Hab. Five specimens captured at Sittoung. I have redescribed the species, as its existence has been doubted, apparently not having been taken since Hamilton Buchanan's time.



et lith.

W West imp.

New species of Idiops

SEMIPLOTUS MODESTUS, sp. nov.

B. iii. D. 4/20. P. 15. V. 9. A. 3/6. C. 19. L. l. 32–34. L. tr. 7½/7½.

Length of head ⅖, of caudal ⅖, height of body nearly ⅓ of the total length.

Eyes. Diameter ⅓ of length of head, 1 diameter from end of snout, 1½ diameter apart.

Snout broad, obtuse, with several open pores on either side. Mouth transverse, inferior. The posterior extremity of the maxilla extends to beneath the middle of the orbit. No horny substance on the jaws. Lower jaw not covered by lip. A knob at the symphysis. Slight motion between the maxillary and intermaxillary bones. No barbels.

Teeth pharyngeal, 4, 3, 2/2, 3, 4.

Colours. Silvery, darkest in the upper half of the body. Ventrals and anal tipped with orange.

Hab. Hill-ranges of Akyab, whence Col. Stevenson procured for me two specimens, of 4½ and 5½ inches respectively in length.

Remarks.—This species appears intermediate between the genera *Semiplotus* and *Cyprinion*; for it nearly agrees with the former in the slight motion of the upper jaw, absence of barbels, &c., whilst it likewise resembles the latter in having a serrated dorsal spine, although it has no horny edge to the lips or barbels. However, those two genera, with this intermediate species, appear to pass so naturally one into the other that I would suggest they should only be regarded as subgenera.

4. Monograph of the Genus *Idiops*, including Descriptions of several Species new to Science. By the Rev. O. P. CAMBRIDGE.

(Plate VIII.*)

In publishing descriptions of new species of a little-known genus, it seemed a fit opportunity to incorporate with them the substance of what has already been made known upon the subject by Continental arachnologists; the present paper will therefore comprise the characters of the genus, and of the only two species of it hitherto known, in addition to the descriptions of the new species.

The genus *Idiops* was first characterized (in 1830) by M. Perty (Del. An. Art. Bras. p. 197); but it appears to have been overlooked by Baron Walckenaer, who seems to have hastily concluded M. Perty's spider to have been a species of the genus *Sphasus* (see Walck. Ins. Apt. tom. i. p. 379, Paris, 1837). It is surprising that Walckenaer should not have recognized in M. Perty's figures and lucid description a species of a new and well-marked genus of the family

* For description of this Plate, see the end of the supplementary paper on the same subject, below p. 157.—ED.

Mygalides. Subsequently M. Guérin-Méneville (without any reference at all to the genus established by M. Perty) founded the genus *Acanthodon* upon another Spider, undoubtedly congeneric with that upon which the genus *Idiops* had been previously established (see 'Arachnides du Voyage de la Favorite,' and 'Revue Zoologique,' 1838, p. 10). This genus, *Acanthodon*, was afterwards, in the Supplement to his history 'Des Aranéides,' included in 'Ins. Apt.' tom. ii. p. 234, by Baron Walckenaer, who also seems to have overlooked its identity with *Idiops*. Since that time nothing appears to have been published upon it. The present occasion, therefore, seems a fit one for the re-establishment of M. Perty's genus, and the rectification of the erroneous reference to his species by Walckenaer in the work above quoted (Ins. Apt. tom. i. p. 379, where the specific name of Perty's Spider is also erroneously given as *Idiops aculeatus*, whereas the name given it in Del. An. Art. Bras. is *Idiops fuscus*).

Of the species* which are now included in the genus *Idiops*, *three* (*Idiops fuscus* (Perty), *I. kochii*, n. sp., *I. petitii* (Guérin)), are from two widely separated localities in South America (Brazil and the Amazons); the *fourth* (*I. sigillatus*, n. sp.) is from the Swan River, West Australia, and in many respects a most remarkable species; the *fifth* is from Beirût in Syria.

Fam. Mygalides.

Gen. Idiops.

Idiops, Perty, Del. Anim. Artic. Bras. p. 197, 1830–34.

Acanthodon, Guérin, Arachnides du Voyage de la Favorite, cl. viii. pl. 16. figs. 1–8; Revue Zool. 1838, p. 10; Walck. Ins. Apt. tom. ii. p. 234.

Characters of the Genus.—Cephalothorax large, oval, in some species uniformly convex above; in others the caput is more or less elevated, and the sides as well as the thoracic portion depressed.

Eyes unequal in size and disposed in three transverse rows, 2, 2, and 4; this last row, the hindmost, is much the longest, curved, and not far behind the second, or intermediate row; while the foremost one is placed at a considerable distance in front, and only just above the insertion of the falces; they may also be described (see Guérin, *l. c. sup.*) as disposed in two groups,—the *first* placed on the anterior margin of the cephalothorax, and composed of two eyes near to each other; the *second* considerably behind and forming a longish narrow transverse oval figure, composed of six eyes.

Falces strong, prominent, and generally armed at their extremities on the upperside with a group of short strong spines.

Maxillæ cylindrical, divergent, almost entirely destitute of any prominence on their inner extremities, so that (like many others of the *Magalides*) the palpus appears to spring from the very extremity of the maxilla.

* *Vide* supplementary notice, in which other new species are described, *posteà*, p. 152.

Labium small, oblong, rather narrower at the apex than at the base.

Legs strong, variously armed with spines, and terminating with three claws, the two superior ones of which are sometimes pectinated.

Palpi long, strong, and armed with spines; in the female sex pediform, and ending with a simple curved claw; in the males terminating with palpal organs, which in general structure resemble closely those of the male sex in all known species of the *Mygalides*, viz. a corneous bulb slightly attached to the underside of the digital joint, and prolonged into a variously formed, but generally simple, spinous projection.

M. Guérin remarks that nothing is known of the habits of his species *I. petitii*; the striking similarity, however, in one portion of its structure (viz. the strong and peculiar spines on the palpi, legs, and falces) seemed to indicate a *habit* similar to that of *Cteniza*, Latr., *Atypus* (Latr.), and *Actinopus* (Perty), *i. e.* the formation of a tubular silken domicile in a hole dug out of the earth, and closed probably by a hinged lid: this habit has been verified in respect to one of the new species described below (*I. syriacus*); and thus M. Guérin's concluding observation, "Elle doit être fouisseuse comme certaines *Mygales* et comme les *Atypes*," has received a striking confirmation in fact.

1. IDIOPS FUSCUS.

Idiops fuscus (*Filariæ mygaloides*), Perty, Del. An. Art. Bras. p. 197, pl. 39. f. 5.

Sphasus idiops, Walck. Ins. Apt. tom. i. p. 379.

Male adult, length 4½ lines.

Cephalothorax suboval, but slightly convex above.

Eyes eight, unequal in size; two small ones situate in front, then two of larger size, and behind these four small ones, placed in a curved line.

Legs long, rather strong, attenuate towards the tarsi; relative length 1, 4, 2, 3.

Palpi almost as long as the cephalothorax and abdomen, first joint forming the maxillæ, last joint in the male inflated and unguiculate.

Abdomen oval; sternum small, flat, subcircular. The whole spider is of a dusky black colour; the coxæ of the legs testaceous; tarsi red. At first sight similar to "*Actinopus tarsalis*," but in structure and position of the eyes wholly dissimilar; on the underside the colour is testaceous brown.

Hab. Brazil.

In the above description, M. Perty omits a strong specific character, well shown in the figure, viz. the strong and tumid radial joints of the palpi.

2. IDIOPS KOCHII, n. sp. (Plate VIII. fig. 1.)

Male adult, length 7½ lines.

Cephalothorax large, oval, transversely truncate before, and moderately convex above; the lateral and posterior margins of the caput are

confluent with the thoracic region; the normal furrows and indentations are strongly marked, the median depression indicating the junction of the caput and thorax being very deep and curved. The colour of the cephalothorax (as also of the whole Spider except the abdomen) is a deep black brown, tinged with reddish, the abdomen being of a dull yellow-brown, blackened by numerous longish bristly black hairs, mingled with the shorter ones of a different colour; the cephalothorax is furnished with bristly black hairs, which chiefly follow the directions of the normal indentations.

Eyes eight, disposed in three transverse rows, seated on a slightly elevated and somewhat circular area: the two front rows consist each of two eyes; the third or posterior row consists of the four smallest eyes, and is much the longest and curved, the curve being directed backwards; the eyes of this third row may be described as in two pairs, those of each pair being contiguous to each other, and forming the extremity of the row; the eyes of the two front rows form an oblong rectangular figure, whose transverse width is the shortest; the eyes of the first row are close above the fore margin of the caput, and are the largest of the eight, but the line formed by them is only equal in length to that formed by the eyes of the *second* row, which last are seated on whitish tubercles and, being smaller than those of the front row, are therefore separated by a wider interval. Several strong black bristles spring up behind the eyes and arch forwards over them; and another, issuing from the centre of the area formed by the two front rows, arches backwards in a direction contrary to those before mentioned.

Legs long and strong, the femora of those of the third pair being specially stout and tumid; they are furnished with blackish bristly hairs and a few spines; their relative length is 4, 1, 2, 3, the length of those of the fourth pair being 18 lines, and of those of the third pair 12 lines; beneath the two superior terminal claws of the tarsi is a compact brush, or small scopula of hairs, which prevented its being ascertained whether a third (or inferior) claw was present or no; the superior claws appeared to be destitute of pectinations; it was not, however, easy to observe this with accuracy; the tibiæ of the first pair of legs are furnished with several spines, of which one is much stronger than the rest, and issues from a small corneous prominence of the tibial joint.

Palpi long and strong, similar in colour and armature to the legs; cubital joint rather clavate, humeral strong and curved; radial longer than the cubital, and rather densely furnished beneath with long bristly hairs; digital joint narrow, oblong, a little constricted about its middle part; from beneath the hinder extremity of this joint spring the palpal organs, which are small and consist of a nearly circular red-brown corneous bulb prolonged into a sort of beak, directed rather outwards, and terminating in a filiform slightly curved point.

Falces moderately strong and prominent, furnished with hairs, bristles, and a cluster of short black spines near their inner extremities.

Maxillæ long, cylindrical, divergent.

The *labium* was almost concealed; but it was apparently very small, though similar in form to that of *Idiops fuscus*.

Sternum somewhat oval in form, but much broader behind than before.

Abdomen small, oval, very convex above, hairy, and of a dull yellow-brown colour, rendered blackish above by numerous bristly black hairs longer than the rest; the plates of the spiracles (four in number) are of a paler colour than the rest of the abdomen; the spinners are also four in number; those of the superior pair being much the longest and strongest, and biarticulate.

An adult male of this Spider was received through Mr. Janson from Pebas (Amazons, South America); it seems to be nearly allied to *Idiops fuscus* (Perty), but is much larger, and differs both in the relative size and disposition of the eyes, as well as in the structure of the palpi. In connecting this species with the name of Dr. Ludwig Koch of Nürnberg, I desire to pay a slight tribute of respect to one of the keenest and ablest of living arachnologists.

3. IDIOPS SIGILLATUS, n. sp. (Plate VIII. fig. 2.)

Male adult, length 9 lines.

Cephalothorax broad, nearly circular, and depressed; caput short, as if truncated before, and its junction with the thoracic region marked by a deep, transverse, and somewhat curved indentation; the other normal furrows and indentations are also pretty strongly marked; the colour of the cephalothorax is a dark yellowish brown, and it is sparingly clothed with yellow-grey adpressed hairs, as well as some short black spiny bristles; a number of strongish black spines and spiny bristles also form a sort of border round its lateral margins.

Eyes eight, placed on a black tubercular eminence of no great height, on the fore part of the caput; they are disposed in three transverse rows, 2, 2, and 4; those of the foremost row are the largest of the eight, near together, and situated immediately above the insertion of the falces; those of the second row are much smaller, and at some distance behind the former, with which they form an oblong rectangular figure, and occupy the summit of the tubercular eminence; not far behind these the four remaining eyes form the third row, which is much the longest and slightly curved (the curve directed backwards); the lateral eyes of this row are large, but rather less in size than those of the first row; the two central eyes are small (the smallest of the eight), and are further from each other than each is from the lateral on its side. From the centre of the rectangle formed by the eyes of the first and second rows, one or two strong, spiny, black bristles rise almost perpendicularly, curving a little backwards; two other bristles of the same kind, but shorter, spring up in a transverse line between the central eyes of the third row, and have their points directed forwards.

Legs moderately long, strong; relative length 4, 1, 2, 3; they are of a reddish yellow-brown colour, and are furnished with hairs, bristles, and black spines of varied length and strength: the tibiæ

of the first pair have two strong, black, tubercular, corneous prominences near their extremities on the inner side; the hinder one of these is by far the longest and strongest; both are furnished with bristles, and at their extremities are some short, strong, blunt, black spines. Each tarsus ends with three claws; the two upper ones are conspicuous, curved, and pectinated; the lower one is small, sharply bent downwards, and not easy to be seen.

Palpi long, strong, similar to the legs in colour, and remarkable in their structure and armature; the *cubital* joints are short, and larger at their fore than at their hinder extremities; on their outer sides, rather underneath, is a sort of longitudinal irregular furrow or suture of a pale colour, with a slight prominence near the middle; the *radial* joints are more than double the length of the cubitals, curved, very strong, and tumid, especially towards their hinder extremities; about the middle of their outer sides is a strong, prominent, tubercular projection, obtuse at its extremity, which (together with the underside) is furnished with very short, strong, blunt, black spines; about halfway between this projection and the extremity of the joint is another, prominent, slender, and cylindrical, of a paler colour than the other, and with a few, very short, tuberculiform, black spines near its extremity; the *digital* joint is rather shorter than the cubital, of an oblong form, very slightly concave beneath, and with its anterior extremity strongly emarginate, or rather produced on either side, mostly so on the inner one. The palpi are furnished with hairs, bristles, and spines; a group of long and strong bristly hairs occupies the underside of the radial joint near its hinder extremity; and the fore extremity of the digital joint is armed with some strong black spines. The palpal organs consist of a long, strong, and tortuous corneous process of a red-brown colour, mixed with whitish; this process is somewhat bulbiform near its base, and terminates with a small, bluntish continuation; in a state of rest this organ extends backwards nearly to the hinder extremity of the radial joint.

Falces moderately strong, prominent, of a red-brown colour, hairy, and armed with a small group of short strong spines near their extremities on the upperside.

Maxillæ strong, cylindrical, divergent, and having the palpi issuing from their extremities; they are thickly fringed on their inner sides with reddish-yellow hairs.

Labium very small, short, rather broader at its base than at its apex, which is rounded.

Sternum large, oblong-oval, much narrower before than behind; this part (with the labium and maxillæ) is similar to the legs in colour; the sternum is also furnished with strong, prominent, bristly hairs, and four smooth, oval, reddish patches or spots form a curved transverse row across its centre, the curve directed backwards.

Abdomen broad-oval, narrower before than behind; it projects over the base of the cephalothorax, is tolerably convex above, round, and abruptly terminated at its hinder extremity; it is of a deep dusky-brown colour, its sides and upper part strongly rugulose, the

wrinkles being sinuous, and with a longitudinal direction; each wrinkle is armed with a single and more or less complete row of short, strong, prominent, black spines; the hinder extremity of the abdomen has four largish, round, bare, black, slightly impressed patches, like seals; the two upper ones are the largest, and are wider apart than the two lower ones; the four form very nearly a square. The spinners (four in number) are short; the superior ones being the longest, strongest, and apparently biarticulate; the four spiracles are connected with conspicuous disks or plates of a reddish-brown colour, mixed with yellowish.

An adult male of this very distinct and remarkable Spider was received through Mr. S. Stevens, from the Swan River, West Australia, in 1864.

4. IDIOPS PETITII.

*Acanthodon petitii**, (Guérin-Méneville) Voyage de la Favorite, cl. viii. pl. 16. figs. 1–8; Walck. Ins. Apt. tome ii. p. 234.

Female adult, length 14 lines.

Cephalothorax elongate-oval, contracted and elevated before, flattened on the sides and behind.

Eyes eight, disposed in two separate groups; the first, situated on the anterior margin of cephalothorax, is composed of two large eyes very near to each other, and placed on a tolerably strong tubercle; the second group is much further back, placed upon a strongish eminence, and forming a very narrow, transverse, oval figure; this group consists of six eyes, the two hindmost ones being rather the smallest.

Palpi long, strong, and pediform, almost as strong as the legs, and armed beneath with short, strong spines, forming a sort of rake (*râteau*).

Legs longish and strong; relative length 4, 1, 2, 3; those of the first two pairs armed beneath the two last joints with short, strong spines similar to those beneath the palpi; each tarsus ends with three claws, the two superior ones much curved, and armed beneath, towards their base, with a strong tooth; the inferior claw is much smaller than the superior ones.

Falces prominent, and armed in front with a group of strong spines.

Maxillæ and *labium* similar in form to those of *Idiops fuscus*.

Abdomen oval, hairy, of a pale dull brown colour, with some largish yellow spots beneath, near the branchial openings; the colour of the *cephalothorax*, *legs*, and *falces* is a lively chestnut-brown, shining, and as if varnished. Spinners four in number and unequal in size. Branchial openings four in number, and placed in the usual position beneath the fore part of the abdomen.

Hab. Brazil.

5. IDIOPS SYRIACUS, n. sp. (Plate VIII. fig. 3.)

Female immature, length 3½ lines.

The general colour of this species is yellow-brown, the cephalo-

* Named after Dr. M. Petit de la Saussaie, by whom it was discovered and presented to M. Guérin.

thorax and falces being rather darker than the legs and palpi, and the abdomen having a duller whitey-brown hue; the hinder part of the caput is elevated or protuberant, the thoracic portion and sides being depressed; the eyes are similarly placed to those of the foregoing species; those of the two foremost rows form an oblong figure, whose width is considerably less than its length, and its fore extremity a little wider than its hinder one; the two central eyes of the hinder row are much further apart from each other than each is from the lateral on its side; the eyes of this row are of a bright pearly-white lustre, and larger than the rest (which are dark-coloured), the external ones being apparently the largest of the eight. From the centre of the long-oval figure formed by the six hinder eyes springs a long, tolerably strong, erect, black bristle, and from the highest part of the caput (behind the eyes) spring two other similar bristles directed forwards; the *legs* are short, strong, and taper rapidly to their extremities; those of the third pair are rather the strongest; they are armed with hairs, bristles, and strong spines, the latter being especially beneath those of the first and second pairs; their relative length is 4, 3, 1, 2, thus differing in this respect from all the foregoing species; but there seemed very little, if any, difference in length between those of the first and second pairs. Each tarsus ends with three claws, the inferior one being very small, the superior pair having apparently but *one* strong tooth beneath, like those of *Idiops petitii*; the *falces* are strong, prominent, and armed with a group of powerful spines at their extremities on the uppersides. The *maxillæ* are furnished with bristles and short spine-like prominences, of which last there are also several at the apex of the labium. The *abdomen* is rather large, oval, and convex above, furnished sparingly with hairs, and of a whitish yellow-brown colour. Spinners four in number; the superior ones stout, biarticulate, but not very long; the inferior ones very small.

This Spider was dug out of a bank close to Beirût, by myself, in May 1864; it was in a tubular web spun in a cylindrical hole formed in the earth, and closed at the entrance, on the surface of the bank, by a hinged lid, similar to that of some other species of the *Mygalides*.

5. Descriptions of Three new Species of Marine Shells from the Australian Coast. By JOHN BRAZIER, C.M.Z.S.

VOLUTA (AULICA) WISEMANI, n. sp.

The shell differs in a great many respects from *V. pulchra*, Sow. The first three whorls, forming the apex, are minutely granular; fourth, tubercle slightly raised, straight and very sharp-pointed, orange-coloured blotches at the suture; fifth with the tubercles raised, sharp-pointed, tipped with orange, fine orange-coloured blotches at the suture, tubercles white between; basal whorl with five prominent tubercles at the angle, sharp-pointed, tipped with orange, be-

tween the tubercles white, below the white runs an irregular interrupted orange band in blotches, white between; towards the base there run from the edge of the lip to the pillar eight irregular large orange-coloured blotches, intermediate spaces trigonal-shaped and white; minute round and oblong brown dots promiscuously scattered all over the shell (at first sight appearing as if it had been done by artificial means); four plaits on the columella, first three plaits conspicuous, lower plait scarcely visible, not extending over on the columella, as in *V. pulchra*, but more slanting; flesh-coloured enamel on the base, but very much puckered; edge of lip tinged with bright orange; interior of aperture flesh-coloured. The red longitudinal lines so characteristic at the sutures in *V. pulchra* and *punctata* are wanting in this: although the differences between *V. pulchra* and *V. wisemani* are of so nice a character, they are nevertheless uniform and constant.

Length 3 inches, apert. 2 inches 3 lines long, breadth 1 inch 6 lines.

Hab. Islands on north-east coast of Australia (*Coll. Brazier*).

Var. With irregular orange blotches, and trigonal-shaped white spots promiscuously scattered over the shell (*Coll. Hargraves, Cox, Rossiter*).

I have named the species after my esteemed friend Commodore Sir William Wiseman, C.B., formerly of H.M.S. 'Curaçoa,' who afforded me all the assistance that lay in his power when I went with him through the South-Sea Islands on a most delightful cruise of four months engaged in collecting specimens of natural history &c.

CONUS COOKI, n. sp.

Shell turbinated, rather thick, inflated, smooth, marked with reddish undulating lines running longitudinally; spire convex, apex blunt; whorls six, strongly striated between the sutures; upper edge of basal whorl white, rounded, and marked with red undulating lines, sometimes straight; lip thin, crenated; base ridged, tipped with white; aperture light blue.

Length 10 lines, breadth 5½ lines.

Hab. Captain Cook's Landing-place, Botany Bay; amongst the rocks (*Coll. Brazier, Hargraves*).

This species very much resembles a young non-coronated specimen of *C. princeps*. The curious undulating hieroglyphical markings are peculiar to *C. cooki*. The lines that run across *C. infrenatus* and *C. aplustre*, Reeve, are not to be found in *C. cooki*. I obtained my specimen at the spot where Captain Cook landed in 1770. My friend Mr. W. H. Hargraves obtained two specimens at Cape Solander, Botany Bay, New South Wales.

CONUS ROSSITERI, n. sp.

Shell turbinated, thin, shining, transversely finely striated under the lens, longitudinally blotched with chestnut-brown, white, and light blue; spire slightly convex, apex pointed; whorls seven to eight; upper edge of basal whorl splashed with white arrow-shaped

spots, alternating with dark square chestnut spots; very finely striated between the sutures; dark interrupted chestnut band across the centre of the shell, below the band faint whitish spots; base ridged, tipped with white, with a dark red band above the white; lip thin, slightly flexuous, edged with brown; interior of aperture white and brown.

Length 8 lines, breadth 4 lines.

Hab. Cape Solander, Botany Bay, New South Wales (*Coll. Brazier*).

This pretty little shell I have named after my friend Mr. R. C. Rossiter, now of New Caledonia, who spent many pleasant hours with me dredging in the harbour of Port Jackson. It is allied to *C. gilvus*, Reeve, but much smaller.

6. Description of a New Species of *Fusus*.

By Henry Adams, F.L.S.

Fusus ventricosus, H. Ad.

F. *testa fusiformi, solidula, longitudinaliter rugose striata, costis obtusis inæqualibus, ad peripheriam majoribus, versus apicem*



Fusus ventricosus.

fusco-nodosis cincta, flavido-alba; anfr. 8, *convexis, prope suturam excavatis; apertura ovata; labro simplici, intus subsulcato; labio calloso, intus nodulis elongatis instructo, antice*

libero, late expanso, umbilicum falsum formante; rostro breviusculo, recurvato, canali aperto, sinuoso.

Long. 130, diam. 60 mill.

Hab. L'Agulhas Bank, Cape of Good Hope.

This species of the genus *Fusus* is remarkable from its ventricose form, recurved rostrum, and from the columellar lip being much expanded at the fore part of the aperture, thus giving it the appearance of being umbilicated. It was dredged on the L'Agulhas Bank, off the Cape of Good Hope, and has been placed in my hands for description by Mr. Cutter, of Great Russell Street. One specimen only was obtained.

February 24, 1870.

Dr. E. Hamilton, V.P., in the Chair.

A communication was read from Mr. R. Swinhoe, F.Z.S., stating that when at Hankow last summer he had ascertained from H.M. Consul in that city that some living Amherst's Pheasants (*Thaumalea amherstiæ*) which had passed that way to England had been received from a French priest, Monseigneur Chauveau, Bishop of Sebastopolis, who was stationed at Ta-tsien-leou, on the Tibetan frontier. Mr. Swinhoe had been permitted to take a copy of M. Chauveau's letter upon the subject, which ran as follows:—

"You may possibly at this moment wait for a letter about the Lady Amherst's Pheasants. Our exertions have been successful enough; and we have to-day in my little mountain-home (so well known to Mr. Cooper) nine Lady Amherst's Pheasants, some of them in a perfectly good state, some in a less suitable condition. These birds are exceedingly common in our hills, but exceedingly cunning likewise. When they perceive, say the natives, in any corner of the hill a small handful of Indian corn or rice, suspecting a snare they do not approach easily, but endeavour with their long tails to sweep away some of the corn in order to eat it without danger. Unfortunately we cannot, at any rate or by any means whatever, save the old ones; they refuse every kind of food. If you present them any thing they will never eat, but they peck your fingers and wound you cruelly; their captivity irritates them, say our good Chinamen. The young ones, on the contrary, appear to be very gentle birds, eating corn or rice in your hand without fear. They have magnificent tails, 24 inches in length generally."

In reference to this communication, Mr. Sclater remarked that there could be no doubt that these birds were those subsequently received by Mr. Stone, and for some time deposited in the Society's Gardens*; and pointed out the position of Ta-tsien-leou on the slope

* See P. Z. S. 1869, p. 468.

of the Yung-lin mountains, between Tibet and the Chinese province of Sechuen.

Mr. P. L. Sclater exhibited, and made remarks on, a specimen of a newly described Lemur of the genus *Indris* from Madagascar, which had been placed in his hands by Mr. A. J. Franks, jun., for that purpose. This animal was stated to have been discovered by Mr. Van Dam during his recent explorations in North-eastern Madagascar, and to have been described by Mr. F. Pollen, C.M.Z.S., under the name *Propithecus damanus*.

A second letter on the ornithology of Buenos Ayres*, addressed to the Secretary by Mr. William H. Hudson, was read. It was as follows:—

"Buenos Ayres, December 22nd, 1869.

"Sir,—A few days ago I wrote you a letter, in which I spoke of the wood bordering on the Plata, and of some of its birds. I will now send you another letter on the same subject.

"South of the city of Buenos Ayres, the low shore of the river is from six to eight miles in width; but for more than half this width the portion furthest from the river is frequently inundated, and covered with reeds and aquatic plants. Passing this there occurs a strip of light and dry land, running parallel with the river, composed chiefly of fossil shells, and grown over with a forest of low trees. In some places this high ground is extremely narrow; in others there are great breaks in it, through which the river passes when greatly swollen. In this strip of forest may be found all the birds inhabiting Buenos Ayres that perch on trees, not even excepting the Pampas Woodpecker (*Colaptes campestris*), of which Mr. Darwin has so unfortunately said:—'It is a Woodpecker which never climbs a tree' (Origin of Species, p. 165). I will reserve for another letter an account of this interesting bird. Between the strips of high ground I have mentioned and the river itself is a low swampy region, often flooded, and covered with *sayus*-trees, interspersed with beds of aquatic shrubs, canes, and reeds. Though there is here in summer a tropical profusion of splendid flowers, the sombre foliage of the trees, and sere withering colour of the reeds, give it a peculiarly sad and desolate appearance. This *sayus*-swamp is a great breeding-place for the Carranchos (*Polybori*) and other Hawks, of which there are great numbers of all the species known in this country. But in this region I have met with a very few species of the small birds found on the pampas. This part of its fauna, like its vegetation, being derived from the north, differs from that of the adjacent country. All such species as are found exclusively in the riverine forest which I have described may be considered as reaching the extreme southern limit of their geographical range at about one degree south of the city of Buenos Ayres. I will now tell you what I have learned of some of these, and will mention others in future.

* See *antea*, p. 83, for Mr. Hudson's first letter.—Ed.

"1. *Bathmidurus variegatus* (Burm.).—I have met with but one individual of this prettily mottled Flycatcher. There is no example in the Buenos-Ayres Museum. It is probably very rare in La Plata, but is, I believe, found in Brazil.

"2. *Tyrannus aurantio-atro-cristatus* (Lafr. et d'Orb.).—Of this species I have also obtained only one specimen. Its flight was like that of the *T. melancholicus*. It was of a uniform dusky colour, with a golden crest. The specimen in the Buenos-Ayres Museum was brought from Entre Rios.

"3. *Fluvicola albiventris* (Spix). The Buenos-Ayres Museum has specimens of this bird from Brazil; but I have met with several individuals here. The black upper and snowy-white lower plumage render it conspicuous; but though so small a bird, it is extremely shy of approach, and has a rapid flight. It frequents the borders of streams, and breeds in the thick bushes of *sarandi* growing in the water. Its only note is a low ticking, uttered when the nest is approached.

"4. *Synallaxis albescens**.—The specimens in the Buenos-Ayres Museum of this bird were obtained in South Brazil. I met with it frequently in the *tola*- and *sayus*-woods, where it unfailingly discovers itself by its loud, harsh, incessant note. It has also in the pairing-season a low strange song, very different from the usual shrill trilling notes of all its tribe. It leaves us in the winter.

"5. *Synalluxis ægithaloides*.—There is no example of this bird in the Buenos-Ayres Museum. Its colour is a yellowish brown. I met with a few individuals of it in some beds of a peculiar reed, of which the only other inhabitants were the *Limnornis curvirostris*. Though only about half the size of that bird, in notes and habits, as well as in habitat, it is exactly similar.

"6. *Lepidocolaptes atripes*.—This bird, remarkable for its extravagantly long bill, I have observed in the *tola*-woods. Their notes are exceedingly loud and shrill; their flight, while passing from tree to tree, rapid, low, and undulating. They invariably alight on the bole of a tree, and sit upright with the head thrown far back, or run round and up the trunk searching for insects in the dead bark. They arrive here late in the spring.

"7. *Thamnophilus argentinus*.—Inhabits the *sayus*-swamps, but is not common. Its low and trilling note is very peculiar, and is more like the song of a night insect than that of a bird.

"8. *Poospiza albifrons* (Vieill.).—Inhabits the *sayus*-woods and reed-beds, but is a rare bird, and resembles in colour the yellow withered herbage which it frequents. I have never heard it sing. The allied species, the *Poospiza nigro-rufa*, is much more common, frequenting the *tola*-woods, and often met with in orchards and hedges at a distance from the river. It is a pretty bird, the ruddy brown throat and breast and the straw-coloured line over the eye contrasting well with the dark upper plumage. It feeds and makes its nest on the ground, but loves to sit in a bush or low tree, and has a sweet and lively song.

* I am now a little doubtful whether the single skin thus named (P. Z. S. 1868, p. 141) was not rather *S. spixi*, of which three examples occurred in Mr. Hudson's third collection (see P. Z. S. 1869, p. 632).—P. L. S.

"9. *Tanagra cyanoptera*.—This bird frequents the *tola*-woods. They come in small flocks in spring, but are afterwards seen in pairs. Its note is low and plaintive. The absence of every colour but blue is the most remarkable characteristic of this bird, even its feet and bill being almost the same pale blue as the entire plumage. The *Tanagra striata* is a much more common bird.

"10. *Stephanophorus leucocephalus* (Vieill.).—A very beautiful bird; in size, shape, and habits like the last. There is no end to the beautiful contrasts of colours in birds; but in few species do they present so lovely an appearance as in this, with the uniform deep rich Prussian blue of its plumage, and the cap of silvery-white feathers with the crimson spot in its centre. It is met with frequently in the *tola*-woods in summer. There is nothing remarkable in the low, chattering song of the male, often repeated for hours while the female is sitting.

"11. *Guiraca glauco-cærulea*.—This bird, characterized by its thick bill, is much smaller than the last, but resembles it somewhat in its dark blue colour and low continuous song. It is a rare bird, inhabiting the *sayus*-swamps, and feeding on the ground on buds and seeds.

"12. *Amblyrhamphus holosericeus*.—A common bird in *sayus*-swamps, found in flocks and remaining with us all the year. The English residents here have called it 'Chisel-bill,' from its bill, formed for extracting insects from the soft stem of decayed reeds, resembling that instrument in shape. Its clear and mellow whistle has also won for it the name of '*Buellero*' (Ox-driver). All its notes are soft, sweet, and flute-like. The plain red of its head and neck, contrasted with the shining black of the other plumage, gives to it a striking and beautiful appearance. Its nest is built in the reeds or shrubs growing in the water; the eggs are four, pale blue and spotted with black; the young birds are entirely black."

Mr. P. L. Sclater read a paper on the Deer of the Old World living in the Society's Menagerie. Amongst these there were stated to be examples of several recently described and very little-known species, of which coloured drawings were exhibited.

This paper will be printed in the Society's 'Transactions.'

Mr. Sclater then made some remarks on the arrangement of the family *Cervidæ*, which he proposed to divide, mentioning only their most obvious external characters, into eight genera, as follows:—

Subfam. I. CERVINÆ.

Cornua decidua: dentes canini parvi aut nulli.

a. Rhinarium pilosum.

- Cornua in utroque sexu ..... 1. *Rangifer*.
- Cornua tantum maris ..... 2. *Alces*.

b. Rhinarium nudum.

a'. Cornua palmata ..... 3. *Dama*.

b'. Cornua non palmata.

- Cauda præsens ..... 4. *Cervus*.
- Cauda extus nulla ..... 5. *Capreolus*.

Subfam. II. Cervulinæ.

Cornua decidua: dentes canini maris exserti ..... 6. *Cervulus.*

Subfam. III. Moschinæ.

Cornua nulla: dentes canini maris exserti.

Apparatu moschifero nullo ..... 7. *Hydropotes.*
Apparatu maris moschifero ..... 8. *Moschus.*

In conclusion, Mr. Sclater pointed out the geographical distribution of the known species of the genus *Cervus*. The total number of *Cervi* recognized as probably valid species were twenty-three in the Old World and seventeen in the New World, namely:—

Cervi *of the Old World.*

a. Cervus

1. ***elaphus***, ex Europa et Asia bor.
2. ***xanthopygus***, ex Asia orient.
3. ***affinis***, ex mont. Himalayanis.
4. ***cashmeerianus***, ex Cashmiria.
5. ***maral***, ex Caucasia.
6. ***barbarus***, ex mont. Atlantis.

b. Sika

7. ***mantchuricus***, ex Sina bor.
8. ***taëvanus***, ex ins. Formosa.
9. ***sika***, ex Japonia.

c. Elaphurus

10. ***davidianus***, ex Sina bor.

d. Rucervus

11. ***duvaucelli***, ex Ind. Brit.
12. ***schomburgki***, ex Siam.
13. ***eldi***, ex Ind. Malayana.

e. Rusa

14. ***aristotelis***, ex Ind. Brit.
15. ***equinus***, ex Ind. Malay. Sumatra et Borneo.
16. ***swinhoii***, ex ins. Formosa.
17. ***rusa***, ex Java.
18. ***moluccensis***, ex ins. Moluccis.
19. ***peronii***, ex Timor.
20. ***marianus***, ex ins. Philippin.
21. ***kuhlii***, ex ins. Bavianis.

f. Hyelaphus

22. ***porcinus***, ex Ind. Brit. et Malayana.

g. Axis

23. ***axis***, ex Ind. Brit. et Malayana.

Cervi *of New World.*

a. CERVUS

1. *canadensis*, ex Amer. bor.

b. CARIACUS

2. *virginianus*, ex Am. bor. orient.
3. *leucurus*, ex Amer. bor. centr.
4. *mexicanus*, ex Mexico et Guatemala.
5. *macrotis*, ex Am. bor. centr.
6. *columbianus*, ex Am. bor. occident.
7. *gymnotis*, ex Venezuela.
8. *savannarum*, ex Guiana.

c. BLASTOCERUS

9. *paludosus*, ex Brasil. et Paraguay.
10. *campestris*, ex Brasil. et Paraguay.

d. FURCIFER

11. *antisiensis*, ex Andibus Boliv. et Peruv.
12. *chilensis*, ex And. Peruv.

e. COASSUS

13. *nemorivagus*, ex Guiana.
14. *rufus*, ex Brasil.
15. *rufinus*, ex Venezuela et Nov. Granada.
16. *toltecus*, ex Mexico.

f. PUDU

17. *pudu*, ex Chilia.

The Secretary read the following letter, which had been addressed to him by Sir George Grey, K.C.B., F.Z.S., in reference to Prof. Owen's communication of a letter from Dr. Haast read at the Meeting on January 27th*:—

"I am much obliged to you for calling my attention to Dr. Haast's statements. I see that he has found some kitchen-middens on the banks of the Rakaia river in the Middle Island of New Zealand, which contained bones of the Moa, the Native Dog, the Seal, the Whale, and also of Sea-Gulls.

"These bones were found in cooking-places or ovens built like those of the Maories, and are now covered by from six to eight inches of silt and vegetable soil.

"I have often found Moa-bones under similar circumstances, sometimes covered by a greater depth of soil; but I have regarded the ovens as of comparatively recent construction. These ovens are Polynesian cooking-places; the Australian and several other savage races cook their food in quite a different way.

"Along with Moa-bones I have several times found bones of the

* See *antè*, p. 53.

Kakapo (*Strigops*), a bird now extinct in the districts where I found the ovens, exactly as the Moa is.

"I have seen many hundreds of old ovens undistinguishable from those in which Moa-bones were found; and in some of these cases the natives were able to tell me the circumstances under which war-parties or travellers had formed these very ovens many years since. I would observe that the native word 'Moa' is a Polynesian word, and the very word which new comers to the islands of New Zealand would have been likely to apply to the *Dinornis*, if they had found it in existence there. The natives all know the word Moa as describing the extinct bird; and when I went to New Zealand twenty-five years ago, the natives invariably spoke to me of the Moa as a bird well known to their ancestors. They spoke of the Moa in exactly the same manner as they did of the Kakapo, the Kiwi, the Weka, and an extinct kind of Rails in districts where all these birds had disappeared.

"Allusions to the Moa are to be found in their poems, sometimes together with allusions to birds still in existence in some parts of the islands. For instance, in page 9 of 'Ko nga Moteatea, me nga Hakirara o nga Maori'*, you will find a man speaking of the death of all his sons, who says, 'Ka ngaro, i te ngaro, a te moa' ('they have disappeared as completely as the Moa'); and, again, at page 324 of the same work you will find in another poem as follows:—

"'Kua rongo 'no au,
Na Hikuao te Korohiko
Ko te rakau i tunua ai te Moa.'

"That is, 'I have heard, indeed, that from Hiknao was the *Korohiko*, the tree or shrub with which the Moa was cooked.'

"Probably the meaning is, that the boughs, leaves, and flowers of that tree were used to cover up the flesh of the Moa in the oven where it was cooked. In the same poem the Weka (*Ocydromus australis*) is immediately afterwards alluded to.

"From these circumstances, and from former frequent conversations with old natives, I have never entertained the slightest doubt that the Moa was found by the ancestors of the present New-Zealand race when they first occupied the islands, and that, by degrees, the Moa was destroyed and disappeared, as have been several other wingless birds from different parts of New Zealand."

The following papers were read:—

1. Notes on the Classification of the *Capitonidæ*.

By C. H. T. Marshall and G. F. L. Marshall.

In examining the classification of this family for our forthcoming monograph, a few points have occurred to us which we should wish to bring to the notice of ornithologists.

We have primarily grouped the Capitonidæ into three well-defined

* New Zealand: printed by Robert Stokes, Wellington, 1853. 1 vol. 8vo.

subfamilies, of which the following diagnoses will furnish distinguishing characteristics:—

a. With the upper mandible toothed or notched ..... *Pogonorhynchinæ.*
b. With margin of mandible smooth; rictal bristles strongly developed ..... *Megalæminæ.*
c. With margin smooth; rictal bristles rudimentary or wanting ..... *Capitoninæ.*

The first subfamily is represented in Africa and America; the second in Asia and Africa; the third is common to all three continents.

The ornithology of Asia and America has received so much attention, and the facilities for research are comparatively so great, that but little remains to be done in the way of classification; and, with the exception of cancelling a few of Bonaparte's genera, of which we are unable to give sufficient diagnoses, we have retained the existing arrangement.

In the American group we have re-united *Eubucco* of Bonaparte with *Capito* of Vieillot.

In the Asiatic group, *Cyanops* and *Chotorea* of Bonaparte are merged in *Megalæma* of Agassiz.

The ornithology of Africa, on the other hand, is considerably less developed, the opportunities for study and research being few and precarious; it contains types of all three subfamilies, and nearly half of the known species, including the most aberrant forms, are found there: among these is one species which we are unable to identify with any of the received generic types, and which presents sufficient structural peculiarities to found a new genus, for which we propose the following name and diagnosis:—

STACTOLÆMA.

Type *S. anchietæ* (fig. 1, p. 119).
1. Rictal bristles rudimentary or wanting.
2. Bill with the margin smooth.
3. Culmen acute, inflated.

The first and second features identify it with the subfamily of Capitoninæ; the third distinguishes it from *Caloramphus* and the remaining genera. *S. anchietæ* is the only species as yet known; it is one of the latest discoveries, and was described and figured in the 'Proceedings' of this Society for 1869, p. 436, as *Buccanodon anchietæ*, by Prof. J. V. Barboza du Bocage. The genus *Buccanodon* of Verreaux belongs to the subfamily Megalæminæ, and has the rictal bristles fully developed; it is similar in form and appearance to *Xylobucco* of Bonaparte, with which we have included it,—*Xylobucco*, the older name, being retained, while *Buccanodon* sinks into a synonym (see figs. 3 & 4, p. 119).

The genus *Trachyphonus* of Ranzani, contains two very distinct types,—*T. margaritatus*, on the one hand, having a comparatively slender, elongated, and much compressed bill, with a fully developed occipital crest (see fig. 5, p. 119); on the other hand, *T. purpuratus* (fig. 6), having a short stout bill, with the culmen strongly arched,

Fig. 1.



Fig. 2.







Fig. 3.

Fig. 4.

Fig. 1. *Stactolæma anchietæ.*
2. *Barbatula leucolæma.*

Fig. 3. *Xylobucco duchaillui.*
4. —— *scolopacea.*

Fig. 5.



Fig. 6.



Fig. 5. *Trachyphonus margaritatus.*
6. —— *purpuratus.*

and no trace of a crest. In fact the marked differences between them are so great that, were there no other species to serve as a link, we should unhesitatingly propose the latter as the type of a new genus. The link is found in *T. cafer* of Le Vaillant, which has the occipital crest fully developed, but in different specimens presents almost every gradation between the two forms of bill. A specimen received yesterday from Mr. J. H. Gurney settles the question, having the bill in shape precisely similar to *T. purpuratus*.

The genus *Trachyphonus* has been included with *Capito* of Vieillot by Schlegel; but this arrangement leads rather to confusion, as the latter is confined to America and differs in the length of tail, which averages two-thirds the length of the wing, while in the former it is as long or longer, and the genus is confined to Africa.

Buccanodon of Verreaux, of which there is but a single species (*B. duchaillui*), we are unable to maintain; it agrees exactly with *Xylobucco scolopacea*, the type of *Xylobucco* of Bonaparte, as will be seen by the figures (p. 119). This latter genus is closely allied to *Barbatula* of Lesson; but as there is no good connecting-link known at present, we have retained them both.

2. On the Pied Wagtails of China.

By R. Swinhoe, F.Z.S.—Part I.

Without comparison of specimens, Indian authors have referred their white-faced black-backed Wagtail to the *Motacilla luzonensis* of Scopoli; and putting faith in Blyth's identification of the ordinary Chinese bird, I have followed suit with ours. Two other races of the same type having been lately procured by me in China I have been led to study this group, and now beg to offer the result of my investigations to the Society.

Not being able to procure a specimen of the Philippine bird, I have nothing to go upon except Scopoli's and Sonnerat's descriptions.

Sonnerat procured from Luzon and described a *grey-backed* pied Wagtail, which he tells us is closely allied to the *grey-backed* pied Wagtail of Europe; but he gave it no name. His description (Voyage à la Nouvelle Guinée, 1776, vol. i. p. 61) runs thus:—"It differs very little from the Grey Wagtail of Europe; it is of the same size and nearly the same plumage, and absolutely the same habits; the top of the head or the part which answers to the forehead, round the beak, throat, and cheeks are white; the back of the head, all the hind neck, base of the neck in front, and upper breast are black; the *back is ashy grey*, the belly is white. There is on each wing a broad white longitudinal spot, which extends from the bend of the wing, or the bastard-wing, across the entire wing; the large quills are black, edged with a white border all round, except the outermost quill, which is quite black; the tail is black above, whitish below; the two outer rectrices of each side are white; the beak and feet are black, iris hazel."

This grey-backed species Scopoli actually diagnoses as *black-backed*, thus:—

"105. Motacilla (luzonensis) *nigra; fronte, gula, pectore, abdomine et fascia alarum albis.*

"*Oculi intra aream album. Pone oculos linea alba, sursum arcuata. Rectrix prima alba.*

"In insula Luzon, p. 60, tab. 29 (referring to the plate in Sonnerat's work)."—*Deliciæ Floræ et Faunæ insubricæ*, by J. A. Scopoli, 1786, part ii.

With such a wrong diagnosis of characters this name can scarcely stand for the *grey-backed* pied Wagtail of Luzon, to which it evidently refers. There may be also a black-backed species in Luzon to which this description would in all probability apply. At all events, through Sonnerat we now know that it refers to a grey-backed species similar to and of the same size as *M. alba* of Europe. Such a bird is *M. dukhunensis*, Sykes, of India, and not the small black-backed type hitherto identified with the Philippine species and bearing Scopoli's name. We must therefore adopt for the Indian species the term *M. leucopsis*, Gould (P. Z. S. 1837, p. 78).

MOTACILLA LEUCOPSIS, Gould.

Length of wing 3·7, of tail 3·75, of tarse ·92. Upper parts from centre of crown black. Wing-coverts broadly margined with white, concealing the black of their bases and forming a pure white bar across the wing. Tertiaries and winglet broadly edged, secondaries conspicuously edged and tipped, and primaries edged to their curve and lightly tipped with white. Axillaries and broad under edges to quills white. Upper tail-coverts more or less edged exteriorly with white. Tail black, the outermost feather pure white, the next with a black border to its inner web. *Breast with a black band not exceeding ½ inch* in breadth. Bill and legs black.

Hab. in India.

The above description is taken from Mr. Gould's type specimen and another in his collection.

In China, from Canton to Shanghai, occurs a race of the above bird which is to be distinguished from the Indian by its whole breast being black. This I have hitherto considered the same as the species of India, but will now separate as

MOTACILLA FELIX, sp. nov.

Length of wing 3·6, of tail 3·6, of tarse ·92. General plumage very similar to the last. The tail has the outermost feather as well as the one next to it bordered on the inner web with black; but among my large series I have a specimen or two in which the outermost is wholly white. The most notable difference is in the breast, which in full summer plumage is black, the black extending upwards till it reaches about ½ inch from the base of the gonys of the bill. Winter and summer this black is conspicuously large. In some specimens a few black speckles show themselves on the white of the

throat, but in no bird of my collection from the coast is the throat black.

Fig. 1.



Motacilla felix.

Fig. 2.



Motacilla felix, var. *sechuenensis.*

In my late trip up the *Yangtsze* at *Wooshan* and *Yunyang* (over 1000 miles from the coast in Western China) I procured at the end of April examples of apparently the same bird with the throat and

chin also quite black. The two forms are otherwise so alike that I cannot possibly separate them specifically, but will distinguish the blackest bird as *M. felix*, var. *sechuenensis* (from Szechuen, the province in which it occurred).

From the Amoor, V. Schrenck describes a Wagtail as *M. alba*, var. *paradoxa*, that looks like another race of this section.

We come, lastly, to an ally of this black-backed group, but with somewhat the face of Mr. Gould's grey-backed *M. personata* of India (Birds of Asia, part 13), for which I beg to propose the name

MOTACILLA FRANCISI, sp. nov.

Length of wing 3·55, of tail 3·7, of tarse ·93. General colour the same as in *M. felix*. Its main difference lies in the black being more advanced towards the forehead in a line with the front corner of the eye, then stretching back, leaving a white eyebrow and advancing at a sharp angle over the ear-coverts to the rictus of the bill; an intervening border between it and the eye and the throat white.

Fig. 3.



Motacilla francisi.

I got an adult male of this species on the 19th May last, near *Chungking* city in Szechuen. I had previously got it at Hainan in undeveloped plumage; but in this plumage the black markings on the cheeks and on the dotted line under the eye are sufficient to distinguish it from *M. felix*, which is otherwise so like it. In the Hainan specimen the third outer tail-feather has a long white blotch of white on its inner web, and the wings are more broadly edged with white than in the Szechuen bird. A second example from Hainan, more immature still, wants the tail-blotch, but shows some dark markings on the cheeks. I consequently take the Hainan and Szechuen birds to be the same. I have dedicated this species to Mr. Robert Francis, one of the two delegates of the Shanghai Chamber of Commerce who accompanied me up the Yangtsze.

I will in conclusion briefly recapitulate the main characters of this black-backed group of the *leucopsis* type. General characters the same in all, as given above.

1. *Motacilla leucopsis*, Gould. With narrow black pectoral band. India.

2. *M. felix*, sp. nov. With the whole breast black. South China (Canton to Shanghai).

3. *M. felix*, var. *sechuenensis*. Breast black to the bill. Western China (Szechuen).

4. *M. francisi*, sp. nov. Breast, ear-coverts, and moustache black. China. Extreme west and south (Szechuen and Hainan).

3. On a New Species of *Accentor* from North China. By R. SWINHOE, F.Z.S.

(Plate IX.)

On my journey back from Mongolia to Peking in the Prefecture of Seuen-hwafoo, which is a tract of country enclosed by two portions of the Great Wall, we halted on the 26th September, 1868, at a place called *Kemeih*, and climbed up the sides of a high mountain, on the top of which stood a monastery. We were in pursuit of the Rock-partridge (*Caccabis chukar*), when a party of red-tailed birds whisked past us and, perching near, kept flying from rock to rock, uttering loud notes. We secured one, and then continued our chase after the Partridges. A few days later I saw another small flock of the same species among the rocks of the fine mountain-pass that leads through the Nankow Gate to the Peking plain. The bird procured was an *Accentor* of the *alpinus* type, most nearly allied to *A. nipalensis* of Hodgson.

ACCENTOR ERYTHROPYGIUS, sp. nov. (Plate IX.)

Head, neck, and breast smoke-grey; lores and under eye mottled with white. Throat for nearly an inch downwards white, with narrow bars of black. Lesser and greater coverts and winglet black, with a large spot of white tipping each feather. Secondary quills black, margined for the greater part of their length with yellowish brown, and broadly tipped with light chestnut terminating with white; on the tertiaries the chestnut brightens, and increases in extent, and the terminal white spots are conspicuous. Primaries blackish brown, edged with light yellowish brown, browner near their bases, and lightly tipped with white. Back light yellowish brown, with broad brown centres to the feathers. Scapulars brownish chestnut, with a median streak of blackish brown and a small white tip to each feather. The yellowish brown of the back soon brightens into brownish chestnut, which is rich and conspicuous on the upper tail-coverts, the longest of which have black centres. Tail brownish black, the outer rectrix with the greater part of its outer



J Smit lith

M & N Hanhart imp

ACCENTOR ERYTHROPYGIUS.

web brownish chestnut, with a broad white tip to the inner web; the rest of the rectrices, except the two centrals, have their outer webs tipped with chestnut, their inner webs with white, and they are narrowly edged with light yellowish brown; the two centrals are more broadly edged and have broad chestnut marks on both outer and inner webs towards the tips. Axillaries dusky, the carpal edge being barred with black and white like the throat. Underparts light yellowish brown, many of the flank-feathers being deep chestnut-brown with white margins, and the abdominal feathers with blackish V-shaped bars and white margins. Under tail-coverts blackish chestnut, with broad white margins and tips.

Bill blackish brown, ochreous-yellow on the sides of the basal half of the lower mandible. Iris chestnut. Legs and toes ochreous, with light-brown claws.

Length about 7·5 inches, wing 4·2, tail 3, bill in front ·55, tarse ·85.

This handsome species may be at once distinguished from its nearest ally, the *Accentor nipalensis*, by the chestnut colour that marks its rump, upper tail-coverts, and tail, by its greyer head and neck, and by the markings of the flanks and belly. *Accentor altaicus*, Brandt, and *A. alpinus*, L., are also members of this group of mottled-throated *Accentors*.

The only other *Accentor* that has been found in China is the *A. montanellus*, Pall., of which Père David has sent me two specimens procured in the neighbourhood of Peking.

March 10, 1870.

John Gould, Esq., F.R.S., V.P., in the Chair.

The Secretary spoke of the additions to the Menagerie during the month of February, and called particular attention to the following:—

1. A Brown Hyæna (*Hyæna brunnea*) from South Africa, purchased of a London dealer on February 7th, being the second specimen of this rather rare Carnivore ever possessed by the Society. The previous specimen (which was a female, purchased in 1853) had died on the 14th of August, 1866.

2. A Cape Grass-owl (*Scelostrix capensis*) from South Africa, purchased February 7th. And

3. A Cape Horned Owl (*Bubo capensis*), purchased the same day. Both these birds were believed to be the first specimens of their respective species exhibited in the Society's Menagerie.

4. A Kangaroo, purchased of a London dealer on the 25th of February, and presenting the appearance of being a young animal

of a species allied to the Red Kangaroo (*Macropus rufus*), about half-grown. After careful examination, Mr. Sclater had failed in his endeavours to associate this specimen with any described species, and therefore proposed as its temporary designation

MACROPUS ERUBESCENS, sp. nov. (Plate X.)

General size and appearance that of a young female Red Kangaroo (*Macropus rufus*), but rather larger than the specimen of the latter species born in September last (with which it is now associated), and ears distinctly larger, and fur thinner and longer.



Macropus erubescens.

Body above pinkish grey, mixed with black hairs, except on nape and upper back; below paler, mesially white. Tail pale brown. Hands and feet blackish. Ears large, on the outer surface blackish, and nearly naked or sparingly covered with very short blackish hairs, as in *M. melanops*. Vertical stripe between the ears and nose black.

Hab. Vicinity of Lake Hope, 200 miles in the interior from Port Augusta, head of Spencer's Gulf, South Australia.

Obs. Mr. Gould, in his 'Mammals of Australia' (Intr. p. xxix),



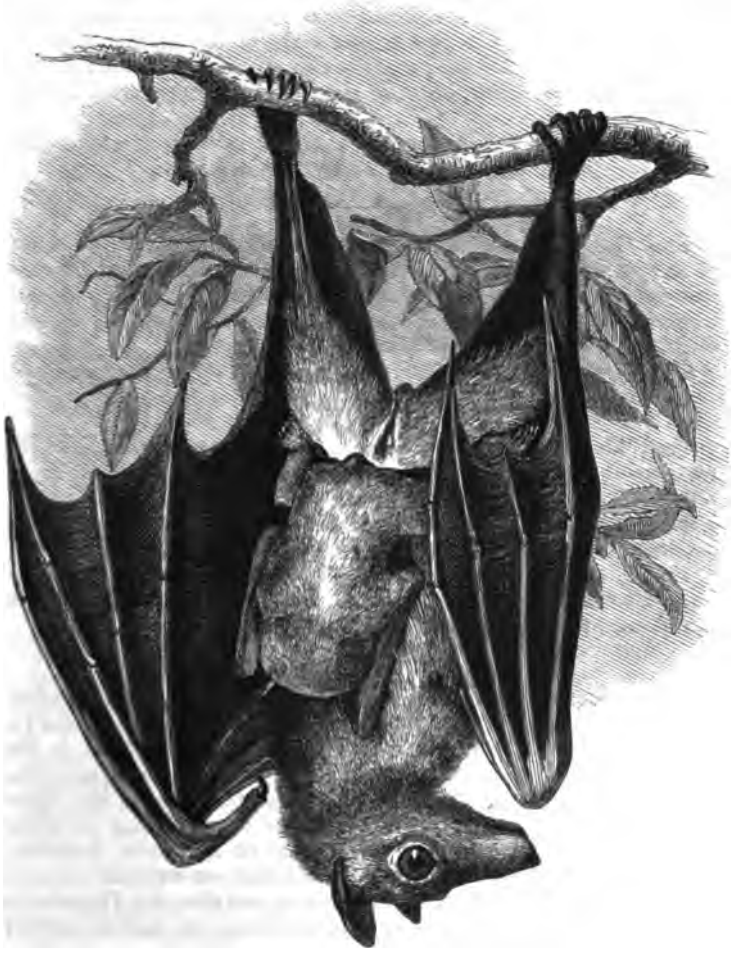
J. Smit. Lith.

M.&N. Hanhart imp.

MACROPUS ERUBESCENS

seems not quite decided about the distinctness of *Macropus major* and *M. melanops*. We have now pairs of both these species living and breeding in the Society's Gardens; and if, as I believe, the latter are rightly named, I think there can be little doubt as to these two animals being distinct. Besides its much smaller size, black face, &c., *M. melanops* is readily distinguishable by its nearly naked ears, which are merely sparingly covered with short blackish hairs. In this latter character *M. erubescens* closely resembles it.

5. A Collared Fruit-bat (*Cynonycteris collaris*), born in the Gardens February 27th.



Cynonycteris collaris, fem. cum catulo.

The male of this Fruit-bat had been purchased on the 27th of May, 1868*, and had been placed in a cage in the Monkey-house along with two other Fruit-bats (*Pteropus medius* and *P. poliocephalus*). On the 1st of November, 1869, a female of the same species was obtained by purchase from a dealer at Liverpool, and placed in the same cage (see P. Z. S. 1869, p. 602). The pair immediately became friendly together, and usually remained in a separate corner of the cage, but were never positively seen to copulate. It is therefore possible, though not very probable, that the female might have been pregnant when received.

The young one was born covered with short smooth hairs of a nearly uniform pale cinereous, darker at the tips. It hung by its hind-claws to the lower part of the body of the mother, with its mouth usually attached to one of the two mammæ, which are placed on the pectoral muscle beneath the wing, as represented in the drawing (p. 127).

This was believed to be the first recorded instance of any of the Chiroptera having been observed to breed in captivity.

Prof. Owen read a paper, containing descriptions of various bones of *Aptornis defossor*, *A. otidiformis*, *Notornis mantelli*, and *Dinornis curtus*, obtained from deposits in various parts of New Zealand, and forming the fifteenth part of his series of memoirs on the extinct birds of the genus *Dinornis* and its allies.

This paper will be published in full in the Society's 'Transactions.'

Prof. Flower exhibited a drawing of a Cetacean animal lately captured in a Mackarel-net off the coast of Cornwall, which he identified with *Globiocephalus rissoanus* (*Delphinus rissoanus*, Laurill.), a species hitherto only known to occur in the Mediterranean. The specimen was stated to be an adult female, about 11 feet long.

Prof. Flower proposed to give a detailed description of the external characters, and an account of the osseous structure of this interesting Cetacean, as soon as its skeleton is prepared.

In reference to Mr. Swinhoe's communication at the last Meeting on the locality of the Amherst's Pheasant (*Thaumalea amherstiæ*†), Mr. Sclater stated that Mr. J. J. Stone had kindly placed in his hands copies of two letters addressed by Monseigneur Chauveau, Bishop of Sebastopolis and Vicar Apostolic of Lhassa, to Mr. Medhurst, the English Consul at Hankow, one of which was the letter spoken of by Mr. Swinhoe. There could be no doubt, therefore, that the birds collected by Monseigneur Chauveau were the same as those which ultimately reached Mr. Stone, and that this Pheasant is "exceedingly common" on the hills bordering the western part of

* See, for notice of its arrival, P. Z. S. 1868, p. 404.

† See *antea*, p. 107.

the Chinese province of Szechuen, beyond the town of Ta-tsien-loo, through which runs one of the great routes to Lhassa.

According to information received from Mr. Stone, it seemed probable that the collections of bird-skins received in Paris, which contained the new Impeyan (*Lophophorus l'huysi*), the new *Ithaginis* (*I. geoffroyi**), and the new *Crossoptilon* (*C. drouynii*†), had been also made in the same district, which would thus appear to be a country of no ordinary interest as regards its *Phasianidæ*.

The following papers were read:—

1. On the Pied Wagtails of China.

By Robert Swinhoe, F.Z.S.—Part II.

At the last Meeting of the Society a paper of mine was read on the Pied Wagtails of China (see *anteà*, p. 120). In that I confined my attention to the *Motacillæ* with white faces and black backs. In the present notice I wish to make the list complete by adding the other species of the group that I have met with in that empire.

4. Motacilla frontata, sp. nov.

The only specimen of this was a male procured in Amoy on the 30th November, 1866. I reported the occurrence in my "Notes on Amoy Ornithology" (Ibis, 1867, p. 390). It is a small species, in form more nearly related to *M. ocularis*, mihi, than to *M. felix*, mihi, but wants the black eye-streak of the former.

Length about 7 inches; wing 3·4; tail 3·5; bill ·45, short and slender; tarse ·83, with small feet and claws. Wing blacker than in *M. felix*, with the winglet and primaries only slightly edged with white. Tail similar. The upper parts are becoming black. The crown and nape black; *forehead also black*, the bases of the feathers white. The nuchal black advances to the ear-coverts, and a broad crescent of the same marks the breast. What the full nuptial plumage would be, it is not easy to guess; but I fancy the whole face and neck would be black, leaving only the eyebrow and throat white. Its greatest peculiarity is in the black forehead, which characterizes *M. lugubris*, Pall., of Western Siberia, and *M. maderaspatana* of Bengal, but is not possessed by any of the others of our Chinese Wagtails.

I was at first inclined to think that this bird might be a cross between *M. ocularis* and *M. felix* (see Ibis, *l. c.*); but the black forehead prevents this supposition. I am now of opinion that it is a good species, with a habitat of its own, but, like most of the Pied Wagtails, that it moves about in winter, and has thus strayed to Amoy.

5. Motacilla ocularis, Swinhoe, P. Z. S. 1863, p. 17.

This species with a grey back I have from various localities from

* Verreaux, Bull. Soc. Acclim. Paris, 1867, p. 709.

† Verreaux, Nouv. Arch. d. Mus. iv. Bull. p. 85, pl. 3.

Hainan to Peking; it also occurs in Formosa. It is resident in all the places that I have observed it, and is probably the *M. albeola*, var. *kamschatica*, of Pallas. I have already described it (P. Z. S. *l. c.*), and now exhibit a diagram of the head and neck in full breeding-plumage.



Motacilla ocularis.

6. MOTACILLA JAPONICA, Swinhoe, P. Z. S. 1863, p. 17.

This Japanese ally of the last, distinguished by its black back and much whiter wing, is only a winter visitant to the coasts of China and Formosa. In P. Z. S. (*l. c.*) a description will be found of it. I gave it a new specific name (Ibis, 1863, p. 85, note), as both *lugens* and *lugubris* had already been applied to the very different western species. I have brought the plate illustrating this bird in the 'Fauna Japonica' to show how much the summer dress of this differs from that of our Chinese *M. ocularis*.

7. MOTACILLA DUKHUNENSIS, Sykes?

In Szechuen, 1100 miles up the Yangtsze, I several times observed a grey-backed Wagtail with a white face, about the size and appearance of the *M. alba* of Europe. On more than one occasion I saw it feeding full-fledged young. Unfortunately, however, I did not secure a specimen. It is more likely to have been the Indian than the European race of this group of Wagtails, and therefore I refer it with a query to the former.

This ends our list of Pied Wagtails, which shows a goodly series.



J. Smit, lith.

M & N Hanhart imp.

LANIUS WALDENI. 1829.

2. Descriptions of seven new Species of Birds procured during a cruise up the River Yangtsze (China). By R. Swinhoe, F.Z.S.

(Plate XI.)

The following new species of birds were obtained by me during a voyage up the River Yangtsze in the spring of last year.

1. Lanius waldeni, sp. nov. (Plate XI.)

Crown, hind neck, and upper back clear bluish grey. Frontal band stretching above and below the eye, and covering the entire ear-coverts, deep black. Back, scapulars, rump, and upper tail-coverts fine brownish chestnut, transversely barred with black. Wing-feathers hair-brown, broadly margined with chestnut-brown, a few of the coverts having black bars, and the tertiaries a wash of chestnut with faint bars; the primaries are a darker brown, with narrower edgings. Tail chestnut-brown, faintly barred, the four outer rectrices on each side being tipped with white. Upper parts, axillaries, and carpal edge of wing a pretty cream-colour, almost primrose in some specimens; under edges of the inner webs of remiges pale salmon-colour. Four out of my five males show a few immature bars on the tibial feathers; and one has a long cream patch on the lores, while another has just the indication of it.

One of the two females has immature bars on the sides of the under parts, has a large cream patch on the lores, and a white half-eyebrow in rear of the eye-line. The other has the basal half of the under mandible pale, a smaller lore spot, the white half-eyebrow, and but a touch of bars on the sides of the breast.

Only one of the males shows the white half-eyebrow, and this the most fully adult one. We may say, then, that the sexes are alike, the males being more richly coloured.

Length about 6·75; wing 3·4; tail 3·1, outermost rectrix being ·65 shorter than the centrals; bill in front ·6, its depth ·33; tarse ·83. Sexes of about equal size.

Bill deep blackish indigo. Eyes large and full, with blackish-brown irides. Legs pale leaden, with a fleshy tinge.

I first saw this species in Fungtoo Hien, Szechuen, on the 5th of May. They were chattering in the trees in notes very similar to those of *L. lucionensis*. All those first procured were males. On the 11th of May, at Changshow Hien, further up the river, I got the first female; and on the 20th, at Chungking, they were paired and beginning to breed, and I observed plenty of them. When at Peking some months before, I noticed a single specimen in Père David's museum, which had been procured in that neighbourhood. The nearest ally of this interesting little Butcher-bird* is the *Lanius*

* Since the above was read I have seen an adult *L. magnirostris*, Less., of Malacca, in Lord Walden's collection, which leads me to believe that our Szechuen bird is that species in summer plumage. All the Malacca specimens that I have seen, from their light bills, are evidently in winter plumage, and in most cases immature.

magnirostris, Less., of Malacca and Sumatra. I have much pleasure in dedicating this novelty to our President, Viscount Walden.

2. ABRORNIS FULVIFACIES, sp. nov.

Forehead and face orange-buff. Upper parts olive-green. The feathers of the crown and occiput long and broad, with broad median blackish-brown streaks. Wings light hair-brown, broadly margined with olive-green. Rump primrose-yellow, greenish on upper tail-coverts. Tail pale olive-brown, broadly margined, especially on the basal half, with olive-green. Under parts dull white, yellowish on the chin, with a large patch of blackish mottling on the throat. A slight band crossing the breast, tibial feathers, and vent greenish yellow. Axillaries yellowish, with yellow carpal edge. Under edges of quills primrose-white. Sexes similar.

Bill brownish ochre, brown on culmen and tip of lower mandible, with black rictal bristles two-thirds the length of the bill. Iris rich brown. Legs and claws brownish ochre.

Length 3·3; wing 1·95; tail 1·7, of ten nearly equal feathers; bill in front ·24, its breadth at base ·12; tarse ·55; fore toes small, with small claws; hind toe large and long in proportion, with strong claw.

Wing: first quill ·82, second ·4, third ·15 shorter than fourth to seventh, which are nearly equal and longest.

This bird is nearly related to *Abrornis albogularis*, Hodgs., and *A. castaneiceps*, Hodgs., of Nepal and Sikhim. Both my specimens have only ten feathers in the tail. Jerdon does not speak of the number of rectrices in the two Himalayan species.

In the bamboo-groves that lined the mountainous sides of the river in Szechuen, about Chungchow and above, I often noticed this diminutive bird. The male utters a long-drawn plaintive whistle, and they chase one another with short chattering notes. On the 10th of May I watched a couple of them in an open copse in front of a cottage; they were picking up and carrying about small bits of straw, no doubt to build their nest with. They were so tame that they allowed me to come within a yard of them. I had not the heart to shoot them.

3. ZOSTEROPS SUBROSEUS, sp. nov.

Close to *Z. simplex* of South China in general colour and appearance. Has a shorter and straighter bill; a yellow forehead; a black line from above the rictus to the fore angle of the eye, encroaching on the white ring. Its wing is edged with darker green. Its axillaries white, with less yellow on the carpal edge. Its under parts greyish white, bluer grey on the sides of the breast, and dingier on the flanks. But the great mark of difference is in its having its belly and the sides thereof washed with a pretty rose-colour.

Bill indigo-black on upper mandible and apical third of lower, basal two-thirds pale indigo-grey. Irides light reddish brown, with whitish outer ring. Legs light lavender-leaden, with dingy yellowish soles and under surface of claws.

Length of male about 4 inches; wing 2·25; tail 1·7; bill ·35; tarse ·6.

I got my single specimen of this species at Hankow from a bird-catcher, who was picking the birds off the trees in the foreign settlement by means of a little bird-lime stuck to the top of a bamboo-pole. He had secured only one of this species, but had plenty of *Muniæ* and young Sparrows.

4. PARUS VENUSTULUS, sp. nov.

Head, throat, breast, neck, and back deep black, glossed with bluish purple. Cheeks and sides of neck, edges of central occipital feathers, a large spot on centre of nape, and some of the upper dorsals at tips, white. A little yellow washes the nuchal and dorsal white. Lower back, rump, and scapulars fine bluish grey, touched with yellowish green. Wing-coverts and tertiaries deep black; the lesser coverts tipped with large spots of white, the greater coverts and tertiaries with light greenish yellow. Quills dark hair-brown; secondaries margined with yellowish green, and lightly tipped with white; primaries yellowish green at basal margins, narrowly edged with white further upwards, and tipped with whitey-brown. Upper tail-coverts deep black, faintly tipped with green. Tail black, deeper and richer on basal half, edged with greenish grey on apical portion, and tipped with yellowish; the fifth rectrix with white on central edge, increasing outwardly to the first or outermost, which has the greater part of basal half of outer web white. Under parts fine sulphur-yellow, olivaceous on the sides and flanks. Axillaries and carpal edge yellowish white. Under edges of inner webs to quills white.

Bill indigo-black. Irides blackish brown. Legs, toes, and claws deep lead-colour. Bill typical, but large and thick for so small a species. Tail graduated inwardly or forked, the central rectrices ·1 shorter than the outermost. Wing: first quill very short; second ·2 shorter than the third and fourth, which are nearly equal and longest.

Length about 4 inches; wing 2·65; tail 1·6; bill ·35, thick ·15; tarse ·64. Claws curved, strong; hind claw moderate.

This charming species occurred throughout the precipitous mountain-gorges through which the great river runs from Kweifoo in Szechuen to Ichang in Hoopih. I found it at the latter place in company with *Parus minor*. It is a very active little species, and has quite a peculiar sibilant note. Its yellow belly recalls *Parus monticola* of the Himalayas, but it wants the black mesial stripe. I could scarcely believe at first that I had got a distinct species, as in Formosa we find the *P. insperatus*, which is little more than a race of the *P. monticola*, and I expected that a black and yellow Tit from Central China would be either that or the Himalayan bird itself.

5. ÆGITHALUS CONSOBRINUS, sp. nov.

Male. Crown light grey, with a few blackish streaks and a few broader white ones. A black line runs over the bill, lores, under the eye, over the ear-coverts, and a little beyond. Above the black over the bill a white line occurs, passing in a distinct eyebrow over and beyond the eyes. Under the black line a white one starts from the base of the lower mandible, and extends onward to meet the eyebrow white beyond the black ear-coverts. Back and scapulars light russet

buff, a deep russet or maroon collar stretching across the hind neck. Wing-coverts blackish brown; the lesser broadly margined with russet buff, the greater on basal half with deep russet, on apical half with light buff. Winglet and primaries hair-brown, narrowly edged with brownish white, the secondaries broadly so, russet at base of edgings, increasing greatly on the tertiaries, which are nearly white, the brown being washed with chestnut and confined to the neighbourhood of the shafts. Lower back well tinged with buff. Upper tail-coverts whitey-brown, with blackish median streaks. Tail hair-brown, with light buff edgings to the feathers. Under parts pale russet buff, nearly white on the throat, deep russet or maroon on the sides of the breast adjoining the nuchal collar; buff on the carpal joint and along the sides of the body. Under edges to quills buff-white.

Female. Dingy grey on the head and hind neck, the dark specks on the crown smaller. Back darker and dingier. The nuchal collar and the lateral breast-spot missing. Eye-stripe brown instead of black; the white above and below the stripe less pronounced. Otherwise similar to the male, but not so bright.

Bill long-conical and pointed, flesh-white, washed with blackish on the culmen and gonys, darker on the former. The male's bill is darker than the female's. Eyes black. Legs strong, deep dingy indigo-grey, including feet and claws.

Length 4 inches; wing 2·25, first quill diminutive, second and third equal and longest, fourth a trifle shorter. Tail 1·75, of twelve feathers narrowing to a point at tips, and graduated inwardly or forked; centrals ·25 shorter than outermost. Bill in front ·35, to gape ·44; tarse ·56; hind toe ·28, its claw ·25.

Walking through the immense market-town of *Sha-she*, on the river below Ichang, I spied a pair of these little Penduline Tits in a cage on a shop counter. I was told that they were captured in the neighbourhood. I consider the discovery of this species most interesting, as affording a case analogous to that of *Cyanopica*, which appears restricted to Spain and Portugal in Europe and then turns up in China about the Yangtsze and northwards, extending to Japan, in a somewhat modified form. The Penduline Tit occurs only in South Europe; and we find it again rather changed on the banks of the Yangtsze 850 miles from the sea.

Ægithalus pendulinus of Europe has a great deal shorter and smaller bill than the Chinese bird, the black cheek-stripe is more extended, and the white eyebrow and moustache are wanting. The deep russet spreads over the back, scapulars, and wing-coverts.

6. EMBERIZA ELEGANTULA, sp. nov.

Female allied to that of *E. elegans*, Temm., but smaller, with less-distinct crest, longer and more *Euspiza*-like bill, with the streaks and spots darker and more decided.

Upper parts brownish grey, the feathers on the crown with deep-brown median streaks; on the hind neck marks of chesnut-brown; on the back and scapulars broad median black streaks, changing sidewards on each feather into chesnut-brown. Eyebrow yellowish white, becoming richer and extending into a bright yellow band across

the occiput, which is almost concealed by the long coronal feathers; lores, under eye, and ear-coverts brown; throat and breast light brownish buff, the latter marked with short streaks of brown. Axillaries and remaining under parts white, broad black and brown streaks running along the flanks and at the base of the tibiæ. Wing-coverts black, narrowly edged with brownish grey, and tipped with creamy white, forming a double bar across the wing; quills hair-brown, narrowly margined with pale reddish brown; the tertiaries blacker, with their edgings broader and washed with rust-colour; inner edges to quills whitish; outermost tail-feather white, with the apical two-thirds of outer web pale brown; second rectrix brown on outer web, white only on apical two-thirds of inner web, making a sharp angle at the shaft with the brown which thence mounts obliquely towards the tip; rest of the rectrices, except the two central, deep brown; the centrals brownish grey, edged paler, with brown stems.

Bill blackish grey, darkest on the apical two-thirds. Irides deep brown. Legs yellowish flesh-colour, with brownish claws.

Length about 5¼ inches; wing 2·65; tail 2·5; bill ·63, its depth at base ·18; tarse ·62; hind toe ·30, claw ·25.

The female above described is the only specimen I procured. It was shot on the sides of the mountain-gorge near Kweichow, the westernmost city of Hoopih province on the Yangtsze, on the 18th April, 1869. I took it at first for the female of *E. chrysophrys*, but it is more nearly allied to *E. elegans* than to that species. Mr. Tristram, after carefully examining and comparing my specimen, pronounced it distinct, and urged me to describe and name it at once.

7. PHASIANUS DECOLLATUS, sp. nov.

Male. Differs from *P. torquatus* of China in having the crown deep brown, its feathers margined with bronzed reflections; in having no white superciliary mark, and no indications of a white collar. The bare red skin of the face is very small. Entire neck fine duck-green, with purple reflections. The feathers of the upper back differ from those in *P. torquatus* in having their centres black, with a narrow median yellowish streak and broad chestnut cross mark. Those of the breast are a duller chestnut, with their black margins reflecting green instead of purple. The black bars of the tail are about the same distance apart, but are much broader.

Bill pale lemon-yellow, slightly tinged with brown. Iris yellow. Eyelid blood-red, fringed with black. Face-skin blood-red, speckled with black. Legs light bluish grey, with brown-tinged toes and claws, the latter tipped with black.

Length of wing 9·25 inches; of tail about 18; bill in front 1·38; tarse 2·65.

On the 13th of May, 1869, the day after our arrival at Chungking-foo in Szechuen, the servant returned from the market with this Pheasant. He fortunately showed it to me before he handed it to the cook. I was at once struck by the absence of the collar, and tried to get more specimens, but without success. The natives declared that they had never seen the Pheasant with the white collar. I consider the want of the collar a very striking peculiarity, as, among the

large number of Chinese Pheasants that I have seen from various parts of China, I have never met a collarless specimen, nor have I ever heard of such a thing. I have, moreover, been assured by friends at home that if in a descendant of a cross between *P. colchicus* and *P. torquatus* any mark of the latter remains, it is sure to be accompanied by a white collar. But, independent of the lack of the neck-ring, I have shown that there are other characters to distinguish the species. It is impossible to presume that our bird could be a cross between the two mentioned species; for between the habitats of our new species and the *P. colchicus* the broadly collared *P. mongolicus* has place. Dr. Anderson of Calcutta procured from Yunnan, the neighbouring province to Szechuen, a collarless species that answers to a cross produced between *P. colchicus* and *P. versicolor* of Japan! It would surely be absurd for one moment to suppose that these two from such distant localities could have met in that wild Mohammedan stronghold. I have a Pheasant from Hankow, 750 miles lower down the river than Chungking. This agrees with the ordinary *P. torquatus* in every respect, except that its broad white collar is broken in the front of the neck, the two ends of the ring being three-quarters of an inch apart. In the markings of the tail the pale-flanked Formosan variety of *P. torquatus* comes nearest to our bird, the bars on the tail of that race being broader and further apart than is ordinary in Chinese specimens.

3. On the Plovers of the Genus *Ægialites* found in China. By R. Swinhoe, F.Z.S.

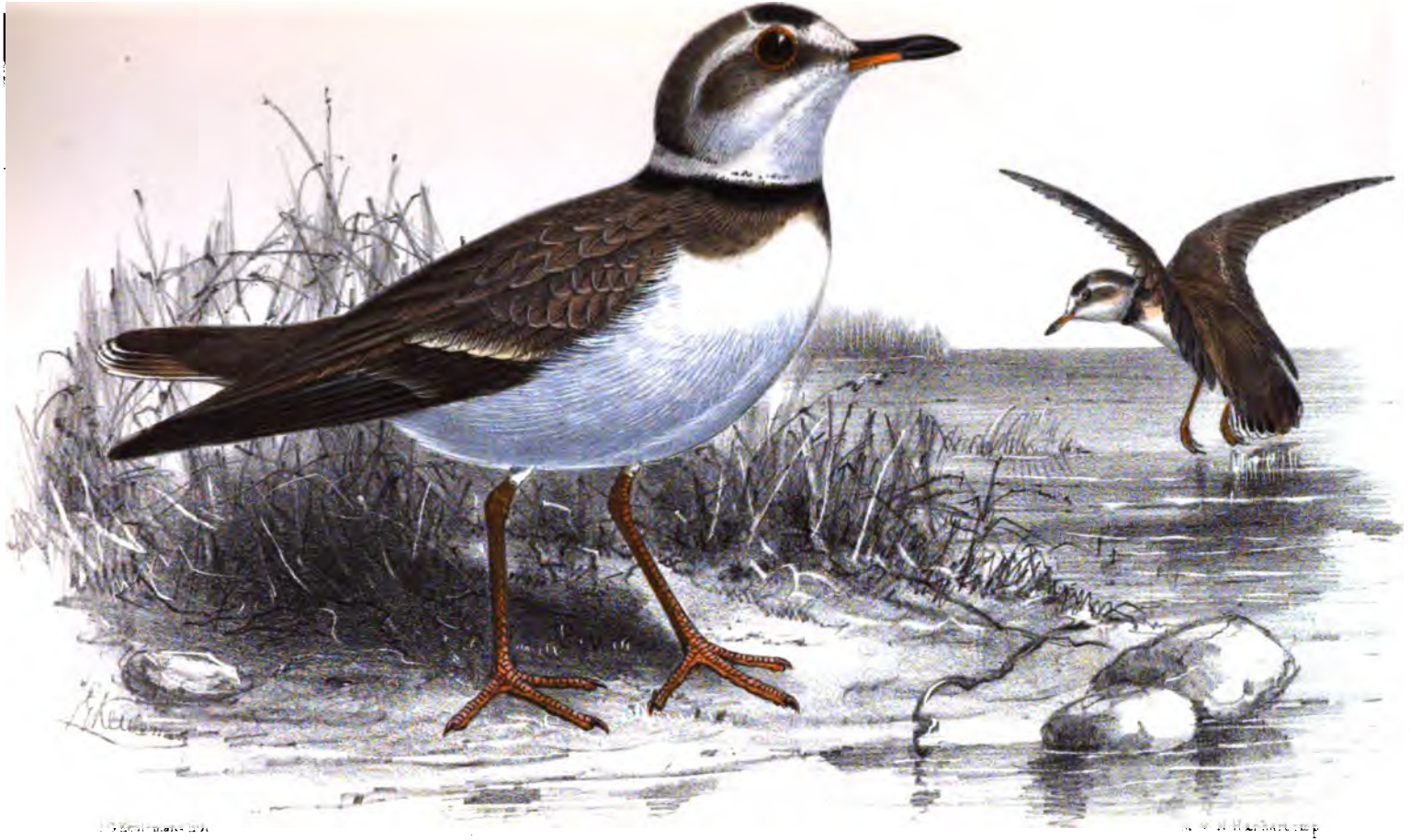
(Plate XII.)

Section I. *Ringed Plovers.*

On ascending the River Yangtsze into the Province of Szechuen I noticed on the rocky and sandy flats, exposed by the falling water, a species of Sand-plover that I had not met before. I took it at first for *Æg. geoffroyi*; but the note it uttered as it rose and flew away was peculiar. It occurred singly or in pairs in May, and was, I believe, breeding, though I did not succeed in finding its eggs. It was shy of approach and somewhat scarce. I was fortunate enough to procure two males and one female. It belongs to the group with double pectoral band, which is represented in America and Africa by *Æg. vociferus* (Linn.) and *Æg. tricollaris* (Vieill.) respectively. I propose to name it in honour of Mr. J. E. Harting, who has made the *Limicolæ* his especial study, and whose kind assistance I have to acknowledge.

1. Ægialites hartingi, sp. nov. (Plate XII.)

Forehead, ring round the neck, and under parts pure white. Upper parts light greyish brown. A broad black patch occurs above the forehead from eye to eye, edged in rear with a narrow indistinct white line. Streak from bill to eye, and continued under the eye



ÆGIALITIS HARTINGI

over the ear-coverts, brown more or less mixed with black. A pure white half-eyebrow above the ear-coverts. On hind neck, below the white ring, a broad black ring extending across the breast; below this a narrow white pectoral bar, succeeded by a broad one of brown more or less mixed with black. Lower edge of wing white; greater wing-coverts broadly margined at their tips with the same. Winglet deep hair-brown. Quills lighter hair-brown, edged and tipped paler; inner secondaries broadly edged with white. Tail light brown; the two central feathers entirely so, but of a much darker hue near their tips; the rest with a broad white tip, succeeded by a blackish-brown broad bar, the black mounting higher on the outer side of the shaft, and the white increasing towards the outermost feather, of which the edge of the outer web, its entire basal portion, and its shaft are white.

Bill blackish brown, the basal third of its lower mandible orange-yellow. Eyelid orange-yellow; eye full and dark. Legs pale ochreous, deeper on toes, with black claws.

Length about 8 inches; wing 5·75; tail 3·2; bill in front ·8; naked tibia ·65; tarse 1·2; middle toe (claw ·17) 1·2, outer toe (claw ·15) ·88, inner toe (claw ·14) ·7. A slight web occurs between the outer and middle toes, running in a deep curve from the first joint of the one to that of the other. The feet extend when stretched backwards to a little beyond the tail; the wings fall a quarter of an inch short of it.

This species is much smaller than *Ægialites vociferus*, and about a third bigger than *Æg. tricollaris*, but has a longer bill than either. In the black and white markings of the head and neck and tail, and in the shape of the last, these three species have much in common, but they differ so much in other respects that there is no chance of confounding them one with another.

Mr. Harting drew my attention to a species of Plover from India with the double pectoral band, which he thought at first might be the same as my Chinese species. He took the pains to search up all the references alluding to it, and has kindly permitted me to peruse them. The species is described by Latham (Ind. Ornith. ii. p. 750) as *Charadrius indicus*; and there is a specimen of it in the Leyden Museum from Nepaul. It turns out to be smaller and quite distinct from ours. A description of the Nepaulese specimen is given in the 'Mus. des Pays-Bas,' *Cursores*, p. 25.

2. ÆGIALITES HIATICULA (Linn.).

Père David had a specimen of the European Ringed Plover in full summer plumage in his museum at Peking. It had been procured in the neighbourhood of the Chinese capital. I have never met with it on the South-China coast.

3. ÆGIALITES CURONICUS (Gm.)*.

Ægialites minor (Meyer).

* This would appear to be the larger form of Little Sand-plover, or *Ægialites intermedius* (Ménétriés) = *Charadrius hiaticula* of Pallas. The smaller form, *Æg. minor* (Meyer) = *Ch. curonicus*, Beseke = *Ch. minutus*, Pallas, has not yet occurred in China, but is known from India, and has been met with in England

This little Plover is a common winter visitant to all parts of the China coast. I procured it as far south as Hainan. In 1860 I found it breeding at Talien Bay; and lately I saw it in May up the Yangtsze, in Szechuen. I have looked through my series, and find them all of one species, identical with birds shot in England. A specimen from India is also the same. Jerdon gives a smaller race, *Æg. minutus* (Pall.), as occurring also in India. This I have never seen in China.

4. ÆGIALITES CANTIANUS (Lath.).

The true Kentish Plover comes down the Chinese coast in winter in great numbers; and I have a good series of them. They vary somewhat in the length of their bills; so I find does the home bird. I have one shot at Amoy in April, which is in full summer plumage and not to be distinguished from an English bird shot in May, kindly lent me by Mr. Harting for comparison. I have also skins from India sent me by Mr. Blyth. Amoy ♂: Bill in front ·65 inch; wing 4·4; tarse 1·05. Bill black. Legs deep leaden-grey.

5. ÆGIALITES DEALBATUS, sp. nov.

Under this name I propose to distinguish the form of Kentish Plover that is resident on the south coast of China, including Formosa and Hainan (see P. Z. S. 1863, p. 52).

Bill black, with an ochreous-yellow spot at base of lower mandible. Legs light yellowish brown or flesh-colour. In other respects like a washed-out *Æg. cantianus*.

♂. Bill ·75 inch; wing 4·45; tarse 1·07.

The male in summer plumage always has the latero-pectoral patch more or less black, as also the band over the white forehead. The loral streak sometimes shows in pale rufescent brown, sometimes in black spots, and is rarely entirely wanting. The crown has generally some rufescence; and a rufescent tinge often washes over the back.

The female in July has a slight rufescence on the head, and a rufescent brown breast-patch. She seldom acquires any of the dark markings of the male.

I procured five specimens of this resident race in Hainan in March, and they were all marked as in summer. In Amoy they generally lose the dark markings in winter.

I have hitherto merely marked this bird as a variety of the Kentish Plover; but as Cassin has separated a similar local form found in California and on the South-American coast, I think it as well to distinguish our bird. The bill and the legs afford the only reliable characters for discrimination. No one can doubt the fact of our local form being derived from *Æg. cantianus*, and that the influence of climate and other local causes have effected a change in the constitution of the bird. It affects to acquire the breeding-plumage of its progenitor, but its system is apparently too weak; yet it breeds and multiplies, and seems otherwise a healthy race. In some specimens of true *Æg. cantianus* I notice a paleness at the base of the

lower mandible, and also in some a paleness of the tarse, both of which by a little intensifying would produce the results characterizing our species. Judging from these, I should consider that it is not long since our southern residents separated from their northern brethren, and remained behind to colonize the coast of the south. If the separation be so recent, it is rather curious that the southern residents receive each winter the visits of their northern brethren without inducing any of the latter to abide with them, or without being induced themselves to return to the home of their forefathers. Want of strength to return to the north may have induced the first individuals to settle in the south; and their offspring may naturally have preferred to continue in their birthplace, in the warm climate they had been reared in.

For the sake of comparison with the above Chinese bird, I will add a notice on a specimen of *Æg. nivosa* (Cassin), ♂, from Peru in summer dress, from Mr. Harting's collection.

Bill in front ·65 inch; wing 4; tarse 1. Bill and legs shorter and more slender than in *Æg. cantianus*. Wants the loral black streak. Wings shorter. Has a washed-out appearance on the upper parts. Crown only tinged with chestnut. Legs paler. From *Æg. dealbatus* it differs in its much smaller bill, and shorter tarse and toes—but, like it, seems to be only a climatal race of *Æg. cantianus*, derived probably in a similar way.

Ægialites niveifrons (Cuv., Less. Tr. d'Ornith. p. 543) of South Africa appears to be another analogous derivative of the same main species.

I was at first under the impression that *Ægialites perronii* (Müller) of Java was another race of *Æg. cantianus*. But in this I am mistaken. Dr. Schlegel, of Leyden, has kindly supplied me with a specimen in the summer and another in the winter plumage, and I will here briefly note their peculiarities.

Charadrius perronii, Müller, Verhandl. Rather smaller than *Æg. minor*, with a thicker bill, longer tarse, and shorter wing.

Summer plumage.—Has a narrow black band over the white forehead. The loral streak is black, but does not meet over the bill, nor does it stretch under the eye; ear-coverts black. The frontal black is not edged posteriorly with white; but there is a white line above the ear-coverts. The crown is pale chestnut-brown, as in *Æg. cantianus*, with a broad white nuchal collar, succeeded by a broad black band, which retains its breadth to the sides of the breast, but becomes very narrow across the breast. The back and wings are light brown tinged with rufous. The greater wing-coverts and secondary quills are edged with white; and the shafts of the primaries, with the tips of the inner ones, are white. The tail-coverts and the six central tail-feathers are blackish brown. The two outer tail-feathers are pure white; the third pale brown edged with white. The bill is black, with a spot of pale ochreous at the base of the lower mandible. The legs look as if they had been pale yellowish brown.

Length of adult male about 6 inches; wing 3·85; tail 2; bill in front ·56; tarse 1; middle toe (claw ·17) ·75.

Winter plumage.—Light brown above, with a rufous tinge on the sides of the head. A narrow band of white runs across the forehead and over to the top of the eye; it then turns rufous, and so passes over the ear-coverts. The loral streak is light reddish brown. The nuchal white ring is indistinctly indicated, being marked with light rufous, which is also the colour of the breast-patch, and runs faintly across the breast. The rest of the under parts are white; and the wings and the tail have the same markings as in the adult.

Section II. *Red-breasted.*

6. ÆGIALITES MONGOLUS (Pall.).

Charadrius mongolus, Pall. Reise, iii. p. 700.
Charadrius mongolicus, Pall. Zoograph. ii. p. 136.

On the South-China coast this bird is a rare winter visitant; but in Hainan I found small parties of them on two occasions in March 1868, and procured two examples in winter dress. In May of the same year numbers of them were exposed in the market at Shanghai in summer plumage; I preserved one. The Hainan and the Shanghai birds agree, and are doubtless of the same species, and identical with the bird which Middendorff met with in large flocks on the 30th of June in the neighbourhood of the débouchement of the River Uda into the Sea of Ochotsk (see Midd. Reise, 1843–44, p. 211). Our bird answers well to his description and plate. He recognizes this species as distinct from *Ch. pyrrhothorax*, Temm., of Russia, and from *Ch. asiaticus* (*caspius*), Pall., and adds (p. 212) that the longer tarse of the latter (39 millims.) makes it easily distinguishable in any dress from the *Æg. mongolicus*.

I will here give a description of my Hainan and Shanghai birds.

Æg. mongolus (Pall.). Winter plumage. Hainan. Upper parts light greyish brown. Loral streak, ear-coverts, and latero-pectoral patch more or less marked with brown. A faint brown bar runs across the breast. Forehead, eyebrow, chin, throat, and under parts white. Wing hair-brown; lower edge of joint, broad margins and tips to greater coverts, margins to secondaries broadening inwardly, basal halves of outer webs of sixth and remaining primaries, first quill-shaft entirely, the others more or less, white. Upper tail-coverts: central feathers light brown margined with white, the side ones pure white. Tail: first or outer rectrix white, with an oblong longitudinal spot of pale brown on the inner web; second light brown, with white shaft and tip; the rest darker brown, with brown shafts and white tips, the white decreasing on the two centrals. Bill black. Legs deep blackish grey, claws black.

Length of wing 5·4 inches; tail 2·5; bill in front ·75; tarse 1·18; middle toe (claw ·17) ·85.

In summer (Shanghai specimen) the upper parts deepen in colour. A light rusty chestnut-colour marks the upper forehead, runs round the crown, and forms a broad nuchal collar extending across the breast and colouring the greater part thereof. The white of the

forehead is diminished in size and divided in its centre by a narrow black line; a black line runs across above the white over the eye to the ear-coverts, and another below the white above the bill to the eye, and under it over the ear-coverts. A little white occurs under the eye, and a little above it in the eyebrow, which is for the most part rufous.

7. ÆGIALITES GEOFFROYI (Wagler).

This is not a rare bird on the South-China coast, where it appears early, departing late. It is also found on the shores of Formosa. Specimens from India and Java agree with the Chinese form. It can at once be told from the two above by its larger size, longer legs, and disproportionately big bill.

Winter plumage generally as in *Æg. mongolus*. *Tail*: first rectrix white, with a faint spot of brown on inner web towards tip; second white, with a light wash of brown along the middle of each web, deepening towards the tip, which is white; the rest all brown, with white tips, the two centrals having less white. The upper tail-coverts are of the colour of the back, but their side feathers are broadly fringed with white. The brown of the central rectrices is deeper than in *Æg. mongolus*.

Length of wing 5·75 inches; tail 2·5; bill ·93; tarse 1·5; middle toe (claw ·18) ·95.

Some of these were also in the Shanghai market in May in full summer plumage. The one I preserved is in coloration very similar to the nuptial dress of *Æg. mongolus*, but has the rusty chestnut-colour tinging the crown and all the upper parts. The black line that divides the white above the bill is a good deal broader than in my Shanghai specimen of *Æg. mongolus*.

8. ÆGIALITES VEREDUS (Gould).

This finishes the series of this genus that have been found in China. It was originally described from Australia. In 1863 we discovered a specimen of it in the East-India Museum, from Java, registered by Dr. Horsfield as *Cursorius isabellinus*; and now Mr. Gould has it in summer dress from Shanghai (China). I have never met with it myself. I will close this paper by giving a description of the Shanghai specimen, which Mr. Gould has very kindly lent me for the purpose.

Charadrius veredus, Gould. Summer plumage (specimen from Shanghai, China). Forehead, throat, belly, and under tail-coverts white. A black rim to the front angle of the eye. Face and eye-brow white washed with light chestnut. Hind neck light chestnut, extending with a broad band of deeper colour across the breast, which darkens downwardly into a deep maroon, with a large black central spot on its lower edge. Crown and upper parts yellowish brown, the feathers on the former edged paler. Lesser wing-coverts, tertiaries, and upper tail-coverts of the same hue as the back, edged with light brownish chestnut. Greater coverts and secondaries light brown, margined at tips with white, the rest of the wing deeper

hair-brown; shaft of first primary white, of second only on apical half; shaft of the rest rich brown. *Tail*: first or outer rectrix white on the outer web and tip; second only on the tip, the rest of the feather being very pale brown; the remaining rectrices are darker-coloured and have ochreous tips.

Bill black. Legs apparently ochreous, with darker toes and black claws.

Length about 9½ inches; wing 6·25; tail 2·75; bill ·94; tarse 1·8.

This large species connects the red-breasted *Ægialitides* with *Eudromias*.

4. On the Birds of Angola.—Part II.

By R. B. SHARPE, F.L.S. &c.

(Plate XIII.)

I have now the pleasure of bringing to the notice of the Society a second collection of birds from this locality, forwarded to me by Mr. Monteiro (*cf.* P. Z. S. 1869, p. 563). Most of the specimens are from Benguela, the southern province of Angola, a few being from the Rio Dande. The last-named locality is about halfway between Loanda and Ambriz, and, I believe, has never before been visited for the purposes of collecting. The whole of the present collection was purchased by Mr. Monteiro of Heer Sala, a Dutch naturalist now in Angola. The interesting notes usually added on the habits of the birds by Mr. Monteiro are therefore wanting; but a few particulars as to the colouring of the soft parts, irides, &c. are given on the labels and are recorded in the present paper.

The collection from Benguela appears to have been formed between the 30th of October and the 31st of December, 1868, at Kattenbella, and that from the Rio Dande between the end of January and the middle of July 1869.

I have, as before, referred to the papers on Angolan ornithology by Mr. Monteiro, Dr. Hartlaub, and Professor Barboza du Bocage; and a dagger (†) is attached to the species believed to be recorded from Angola for the first time.

From Kattenbella.

NECTARINIA GUTTURALIS.

Nectarinia gutturalis (Linn.); Sharpe, P. Z. S. 1869, p. 566.

Two males. December 8th and 10th, 1868. Eye black; bill and feet black.

AËDON PŒNA.

Male. December 31st, 1868. Eye black; bill and feet black.

I was at first inclined to consider this an undescribed species; but on comparing my bird, in company with Dr. Tristram, one of our



M & N Hanhart imp

1. LANIARIUS MONTEIRI. 2. L. ICTERUS

first authorities on the *Sylviidæ*, with specimens of *Aëdon pœna* (Smith) from Damara Land, we came to the conclusion that it was not advisable to separate them. The head is browner, and the upper surface of the body generally darker than in the last-named species; but as the specimen is in somewhat worn plumage, I think it best to wait for the arrival of additional examples before deciding on its specific distinctness from *Aëdon pœna*.

MOTACILLA VIDUA.

Motacilla vidua, Sund.; Sharpe, P. Z. S. 1869, p. 567.

Male. October 31st, 1868. Eye black; bill and feet black.

EUROCEPHALUS ANGUITIMENS.

Eurocephalus anguitimens, Smith, Mont. P. Z. S. 1865, p. 93; Bocage, Jorn. Acad. Lisb. i. p. 334.

Female. November 1st, 1868. Eye black; bill and feet black.

PASSER DIFFUSUS.

Passer diffusus (Smith), App. to Rep. of Exp. p. 50.

Passer simplex, Layard, Birds of S. Afr. p. 205 (*nec* Sw.), *et* Bocage, Jorn. Acad. Lisb. p. 153 (?).

Male. October 31st, 1868. Eye brown; beak black; feet pale yellowish.

Judging from the limited material I have been able to obtain, I am very much inclined to think that the present species has often been mistaken for the true *Passer simplex*, Swains., the occurrence of which in South Africa I am inclined to doubt. Thus Dr. Hartlaub and Mr. Layard record *P. simplex* from Southern Africa. There seem to me to be three closely allied but representative species,—*P. simplex* from Western Africa, *P. swainsoni* from North-eastern Africa, and *P. diffusus* from South-western and Southern Africa. *Passer swainsoni* appears to be distinct from *P. simplex*, and has not the whitish throat and abdomen of the latter species, besides being considerably larger. *Passer diffusus*, on the other hand, is somewhat larger than *P. simplex*, and has the abdomen and throat very pure white. I subjoin the dimensions of the two specimens contained in the present collection along with those of *P. simplex* and *P. swainsoni*, taken from birds in my own collection.

	Long. tot. in.	rostr. in.	al. in.
a. *P. diffusus*. Angola	5·5	0·5	3·2
b. *P. diffusus*. Angola	6·0	0·5	2.25
c. *P. simplex*. River Gambia	5·0	0·45	2·85
d. *P. swainsoni*. Abyssinia	6·7	0·5	3·45

†LAGONOSTICTA MINIMA.

Estrelda minima, Vieill.; Hartl. Orn. Westafr. p. 144.

One male specimen.

VIDUA PRINCIPALIS.

Vidua principalis, Linn.; Hartl. Orn. Westafr. p. 136.
Vidua decora, Hartl. Ibis, 1862, p. 340.

a. "Male. December 2nd, 1868. Eye black; beak red; feet black.
b. "Male. December 9th, 1868.
c. "Male. January 1st, 1869.
d. "Female. January 1st, 1869."

Dr. Hartlaub (*l.c.*) has separated the southern *Vidua principalis* under the name of *Vidua decora*, on account of the supposed absence of the black chin-spot. I am sorry that I cannot agree with him on this point, but my conclusion is based upon the examination of a large series of specimens in my own collection. Dr. Hartlaub also considers *Vidua decora* to be somewhat smaller. I therefore give the measurement of the wing in the birds now lying before me.

1. Katenbella (*Sala*), December 9th, 1868. Least possible indication of a chin-spot. Wing 2·8 inches.
2. Katenbella (*Sala*), December 2nd, 1868. Chin-spot very plainly developed. Wing 2·95.
3. West Africa (*Fraser*). Chin-spot plain. Wing 2·65.
4. Natal. Chin-spot just becoming visible. Wing 2·85.
5. River Gambia. Chin-spot very plain, broad, and extending nearly 0·3 inch down the throat. Wing 2·7.
6. Fantee. Chin-spot very plain. Wing 2·75.
7. Fantee. Chin-spot distinct. Wing 2·75.
8. Fantee. No chin-spot at all. Wing 2·8.
9. Otjimbinque, Damara Land, November 17th, 1869 (*Andersson*). Small chin-spot. Wing 2·9.
10. Damara Land (*Andersson*). Small chin-spot. Wing 2·9.
11. Cape Colony (*Layard*). No chin-spot. Wing 2·8.

From the above measurements it will be seen that great variation in size prevails, even in birds from identical localities. The black chin-spot seems to be equally variable, being present in southern specimens, while northern specimens are also found without it. As far as my own experience goes, there is only one species, viz. *Vidua principalis*, found in West and South Africa, and the black chin-spot is only assumed in the height of breeding-plumage.

HYPHANTORNIS CINCTA.

Hyphantornis cincta, Cass.; Mont. P. Z. S. 1865, p. 93; Bocage, Jorn. Acad. Lisb. i. p. 139.

Male. October 30th, 1868. Eye red; beak black; feet light yellow.

TOCCUS MONTEIRI.

Toccus monteiri, Hartl. P. Z. S. 1865, p. 87; Mont. P. Z. S. 1865, p. 91.

Male. December 31st, 1869. Eye pale lilac-colour; beak red; feet black.

HALCYON SENEGALENSIS.

Halcyon senegalensis (Linn.); Sharpe, P. Z. S. 1869, p. 568, *et* Monogr. *Alced.* pt. 7.

Two males and two females. November 30th and December 10th, 1868. Eye black; feet black.

MEROPS SUPERCILIOSUS.

Merops superciliosus, Linn.; Gray, Hand-l. of B. i. p. 99.

Dr. Otto Finsch, in his very elaborate little essay on a collection of birds from Natal (Journ. f. Orn. 1867, p. 237), has very carefully gone into the question of the identity of *Merops superciliosus*, *M. ægyptius*, and *M. chrysocercus*. I entirely agree with him, and believe that *M. superciliosus* is nothing but the young bird. Although the dull bronzy brown of this so-called species would seem at first a good character whereby to separate it, yet it must be noted that in every specimen I have yet examined there has always been here and there a blue lustre to be seen on the back, indicating an approach to a more mature stage of plumage. In the so-called *M. superciliosus* the line below and above the eye is always pure white, as also is the chin; but generally a blue lustre is very apparent on the eye-stripes; and in adult birds (*M. ægyptius*) very often a white feather or two may be distinguished among the blue superciliary feathers.

I subjoin the dimensions of the specimens in my collection.

		Long. tot. in.	rostr. in.	al. in.
a. ♂.	Madagascar (*Verreaux*)	12·0	1·7	5·4
b. ♂.	Egypt (*Shelley*).....	11·7	1·7	5·8
c.	Egypt (*mus. R. B. S.*).....	11·9	1·7	5·7
d.	Egypt (*mus. R. B. S.*)	12·3	1·7	6·1
e. ♂.	Ondonga (*Andersson*)	10·2	1·7	6·0
f. ♀.	Ondonga (*Andersson*)	9·2	1·35	5·5
g.	Angola (*Sala*)	10·8	1·65	5·4
h.	River Gambia (*mus. R. B. S.*).....	10·5	1·5	5·8
i.	River Gambia (*mus. R. B. S.*).....	8·9	1·4	5·3

Specimens *f* and *i* are possibly breeding females and have no long tail-feathers, which will account for the disparity in their length when compared with the other specimens.

CENTROPUS SUPERCILIOSUS.

Centropus superciliosus, Rüpp.; Mont. P. Z. S. 1865, p. 91; Bocage, Jorn. Acad. Lisb. i. p. 326.

a. Male. November 30th, 1868. Eye red; beak and feet black.

CHRYSOCOCCYX CUPREUS.

Chrysococcyx cupreus (Bodd.); Gray, Gen. of B. ii. p. 463.
Chrysococcyx auratus (Gm.); Hartl. Orn. Westafr. p. 190.

a, *b*. Two males. December 1st and 9th, 1868. Eye red; beak and feet black.

PSITTACULA ROSEICOLLIS.

Psittacula roseicollis (Vieill.); Mont. P. Z. S. 1865, p. 94; Finsch, Papag. ii. p. 640.

Agapornis roseicollis, Boc. Jorn. Acad. Lisb. i. p. 336.

Male. October 30, 1868. Eye red; beak pale green; feet pale lilac-colour.

GYPOHIERAX ANGOLENSIS.

Gypohierax angolensis (Gm.); Hartl. Orn. Westafr. p. 1.

Female. December 10th, 1868. Eye yellow; bill very pale green; feet greyish.

Knowing that Mr. J. G. Keulemans had observed this bird during his residence in the Cape-Verd Islands, I applied to him for a note on its habits; and I have much pleasure in subjoining the details which he kindly forwarded to me.

"This is one of the most abundant birds of prey in the Cape-Verd Islands. It is chiefly seen in those islands where there is but little vegetation, and seems to prefer rocky ground and bare mountains for its habitation. These birds are always found in company, groups of six to fifteen in number being ordinarily seen together. From daybreak to sunset, troups are seen flying at different elevations, circling round and round for hours without moving their wings. Their flight is Vulture-like; and I always observed that when five or more individuals were circling in the air, another body was seen flying about a hundred feet above them; still higher another flock was observed, and so on until the highest flocks were but faint white specks in the distance. When on the ground they walk, but when in a hurry hop like a Magpie. They sometimes sit, half sleeping, on a bare rock or on the ground, but on the least alarm they fly up suddenly and go a long way before they settle.

"The continual persecution and destruction of these birds by the inhabitants has made them exceedingly shy and suspicious, so that it is very difficult to approach them; early in the morning, however, I sometimes managed to get near them. The best way to shoot them is when they fly near the ground, which they sometimes do when in pursuit of rats or mice. The sexes seem to be alike in coloration; but I believe the females are larger than the males, as I always observed some little difference in the size of the birds.

"Young birds are brown, some of them irregularly spotted with white, probably when moulting or changing their plumage. I once received a young bird in the down; it was of a dirty white colour, but the bill, legs, and iris were like the old birds. In the adult the colour of the bill is bluish, with a yellowish-pink cere and nostrils; legs dirty pink and irides pure white. On one of the rocks to the north of the island of St. Vincent there has been a nest for several years; this rock is nearly 80 feet high, and when seen from a distance it has the appearance of a man sitting, whence it is called by the inhabitants 'John Look-out'!

"On John's Head is the nest of *Gypohierax angolensis*; and this is

the only nest to be seen in St. Vincent. It is enormously large and high, something like nine feet in diameter, and is composed of dead branches. An old pair of birds breed here every year; and, according to the inhabitants, three young ones are duly hatched and fly in March or April. A remarkable fact is, that, of the great number of these Eagles which inhabit these islands, only one pair is found breeding, while the other ones still remain flying about as usual, and do not seem to pair or go elsewhere to breed.

"I once found another nest high up in the mountains, but could only observe it from a distance, as it was placed in an inaccessible position and there was no way of getting near it. The chief food of this species consists of rats, mice, lizards, sometimes big grasshoppers, but seldom fish, though they often skim over the water.

"The native name on St. Vincent for this bird is 'Gaivotta,' on St. Iago 'Falcao.'"

TRERON CALVA.

Treron calva, Temm.; Sharpe, P. Z. S. 1869, p. 570.

Two males. December 25th, 1868. Eye pale blue; beak red, with the point white; feet yellow.

COTURNIX HISTRIONICA.

Coturnix histrionica, Hartl.; Bocage, Jorn. Acad. Lisb. ii. p. 46; Sharpe, P. Z. S. 1869, p. 564.

a. Male. November 29th, 1868.

b. Male. December 2nd, 1868. Eye brown; beak black; feet light yellow.

ORTYGOMETRA ANGOLENSIS.

Ortygometra angolensis, Hartl. Ibis, 1862, p. 335; Bocage, Jorn. Acad. Lisb. i. p. 148.

Male. December 12th, 1868. Eye red; beak pale green; feet pale lilac-colour.

HIMANTOPUS MELANOPTERUS.

Himantopus melanopterus, Meyer; Bocage, Jorn. Acad. Lisb. i. p. 329.

Male and female. November 5th, 1868. Eye red; beak black; feet red.

†PODICEPS NIGRICOLLIS.

Female. November 15th, 1868. Eye red; beak and feet black.

Apparently new to the avifauna of Western Africa, as I cannot find any record of the Eared Grebe having occurred there. The specimen is in winter plumage.

HYDROCHELIDON FISSIPES.

Hydrochelidon fissipes (Linn.); Gray, List of Br. B. p. 243 (1863).

Female. November 5th, 1868. Eye black; feet red; beak black.

From the Rio Dande.

COSSYPHA HEUGLINI.

Cossypha heuglinii, Hartl. Journ. f. Orn. 1866, p. 37.
Bessornis heuglinii, Heugl. Orn. N. O. Afr. i. p. 375, tab. 13.

Male and female. April 25th, 1869. Eye black; beak and feet black.

This species, if proved to be the same as *Cossypha intermedia*, Cabanis, which seems likely, will be found to possess a very extended range.

ORIOLUS LARVATUS.

Oriolus larvatus, Licht.; Mont. Ibis, 1862, p. 235, *et* P. Z. S. 1865, p. 93.
Oriolus rolleti, Salvad.; Heugl. Orn. N. O. Afr. p. 404.

Male. June 24th, 1869.

A single specimen of the small race of *Oriolus larvatus*. The whole question of these races is discussed in a paper on the African *Oriolidæ*, published in the April number of the 'Ibis.'

MOTACILLA VIDUA.

Motacilla vidua, Sund.; *antea*, p. 143.

Two males. April 19th, 1869.

PRIONOPS TALACOMA.

Prionops talacoma, Smith; Mont. Ibis, 1862, p. 337.

Female. March 7th, 1869. Eyelids yellow; bill black; feet reddish.

DICRURUS, sp.

Female. April 25th, 1869.

A young bird, on which I do not give a decided opinion until I have more material to decide upon.

LANIARIUS MONTEIRI, sp. n. (Plate XIII. fig. 1.)

L. *affinis* L. ictero, *sed statura paullo robustiore, dorso saturatiore, ala breviore, et præcipue superciliis albis conspicue distinguendus.*

Entire head and neck blue-grey; back and scapularies rich olive-green, the feathers of the rump margined with clear yellow; wing-coverts spotted with whitish yellow; quills black, margined externally with rich olive-green, some of the primaries being edged with whitish yellow, the innermost secondaries being broadly tipped with a bar of whitish yellow; tail olive-green, tipped with whitish yellow; lores, feathers round the eye, and a broad eyebrow, extending over the ear-coverts and down the sides of the neck, pure white; entire under surface rich lemon-yellow.

Compared with *L. icterus* (Plate XIII. fig. 2) the present species is at once distinguished by the very broad white eyebrow in addition

to the somewhat shorter wing and larger size. The following are the comparative measurements (in inches) of the two species:—

		Long. tot.	al.	rostr.
1. *L. monteiri.*	Angola	9·5	4·2	1·3
2. *L. icterus.*	R. Gambia	10·0	5·0	1·2
3. *L. icterus.*	Casamanze	10·0	4·8	1·2
4. *L. icterus.*	W. Africa	9·5	4·9	1·2

The primaries in *L. monteiri* seem hardly to have attained their full growth. The specimen is marked a female.

VIDUA PRINCIPALIS.

Vidua principalis, Linn.; *anteà*, p. 144.

Male. July 18th, 1869.

This bird appears to be in full winter plumage, and agrees very well with a male bird in my collection, which was shot at Otjimbinque, Damara Land, by the late Mr. Andersson, on July 8th, 1866.

TOCCUS MELANOLEUCUS.

Toccus melanoleucus (Licht.); Bocage, Jorn. Acad. Lisb. ii. p. 45.

Two males. July 4th, 1869. Eye red; beak red; feet black.

IRRISOR ERYTHRORHYNCHUS.

Irrisor erythrorhynchus (Lath.); Mont. Ibis, 1862, p. 334.

Male. April 25th, 1869. Eye black; bill and feet red.

HALCYON SENEGALENSIS.

Halcyon senegalensis (Linn.); Sharpe, P. Z. S. 1869, p. 568, *et* Monogr. *Alced.* pt. 7.

Two females. July 10th, 1869. Eye black; feet black.

CERYLE MAXIMA.

Ceryle maxima (Pall.); Sharpe, Monogr. *Alced.* pt. 6.

Male. July 8th, 1869. Eye black; bill and feet black.

CENTROPUS SUPERCILIOSUS.

Centropus superciliosus, Hempr.; *anteà*, p. 145.

Five males. April 18th–21st, 1869.

†CIRCAËTUS CINERASCENS.

Circaëtus cinerascens, Von Müll. Naum. 1851, Heft iv. p. 27, *et* Descr. Nouv. Ois. d'Afr. pl. 6 (1853).

Circaëtus sonnrus, Pr. Würt. MS.; Heugl. Syst. Uebers. p. 8 (1856), *et* Orn. N. O. Afr. i. p. 86, tab. 3 (1869).

Male. January 28th, 1869. Eye red; feet yellow.

It seems to me a manifest injustice to Baron von Müller, who duly published a description of this bird in 1851, to allow his name to be superseded by the MS. name of the Duke of Würtemberg,

which may have existed in MS., but was not published for some years after v. Müller's.

MELIERAX MONOGRAMMICUS.

Melierax monogrammicus (Temm.).

Micronisus monogrammicus, Bocage, Jorn. Acad. Lisb. i. p. 331, *et* ii. p. 47.

Female. April 19th, 1869. Eye red; feet yellow.

TURTUR ERYTHROPHRYS.

Turtur erythrophrys, Sw.; Mont. P. Z. S. 1865, p. 94; Bocage, Jorn. Acad. Lisb. i. p. 337, ii. p. 46.

Male. June 17th, 1869. Eye red; beak black; feet red.

†PERISTERA AFRA.

Peristera afra (Linn.); Hartl. Orn. Westafr. p. 197.

Male. April 19th, 1869. Eye black; beak black; feet red.

PARRA AFRICANA.

Parra africana, Gm.; Mont. P. Z. S. 1865, p. 90; Bocage, Jorn. Acad. Lisb. i. p. 148.

Male and female. June 23rd, 1869. Eye black; feet blue; beak black.

ARDETTA STURMI.

Ardetta sturmii, Wagl.; Bocage, Jorn. Acad. Lisb. vol. ii. p. 46.

Male. May 20th, 1869.

5. Note on the Locality of *Megalixalus infrarufus*. By Dr. A. GÜNTHER, F.R.S., F.Z.S.

The Tree-frog which I described under the name of *Megalixalus infrarufus*, in the Proceedings of this Society for 1868 (p. 485), proves to be a species from Mahé, one of the Seychelle Islands. We are indebted for its discovery to Prof. E. Perceval Wright, who, on his return placed the examples in my hands, unfortunately without a label indicating their origin, which, after the lapse of a few months, had been forgotten.

6. Notes on *Prototroctes*, a Fish from Fresh Waters of the Australian Region. By Dr. A. GÜNTHER, F.R.S., F.Z.S., &c.

In the year 1864, I described a new genus of freshwater fishes from southern Australia, from the indifferently preserved skin of a

single example which was obtained for the British Museum in a collection of fishes sent from Victoria to the International Exhibition in 1862 (Fish. v. p. 382). I then associated it with *Haplochiton*, a genus inhabiting cold fresh waters of Tierra del Fuego, of the Falkland Islands, and of the southern parts of the South American continent. The characters, as far as they could be observed, seemed to warrant the propriety of uniting the two genera into a family, *Haplochitonidæ*; and for the new genus the name of *Prototroctes* (in allusion to its Salmonoid affinities) was proposed. A few days ago two perfect specimens of the latter genus, preserved in spirits, were submitted to my examination*; and I am now enabled to complete the description of the generic characters, as well as to add a second species to the genus.

These fishes have entirely the appearance of *Coregonus*. The body is covered with cycloid scales of moderate size; the first dorsal short, immediately behind the middle of the length of the fish, and immediately behind the insertion of the ventral fins; adipose fin small, opposite to the end of the anal, which is not much longer than the dorsal. Caudal fin forked. The structure of the mouth is entirely different from that of *Coregonus*; it is of moderate width, and cleft to below the eye; the snout is pointed, with a mesial notch to receive the soft skinny end of the lower jaw; the intermaxillary and maxillary are intimately attached to each other along their whole length, and the margin of the upper jaw is formed by the intermaxillary only. The upper jaw is provided with a series of minute teeth, slightly bent inwards, very similar to those of *Mugil*, not anchylosed to the bone, but imbedded in a cartilage with which the intermaxillary bone is covered. Lower jaw with a series of minute teeth, which are more distantly placed than those of the upper, and inserted in the bone itself: a layer of horny substance, such as is found in many Cyprinoids, intervenes between the upper and lower jaws, and is easily detached from the lower. Vomer and palatine bones with a single series of minute teeth; *tongue on each side with a series of small recurved teeth*. Gills four. *Pseudobranchiæ none*. Branchiostegals six, short, broad, as in *Coregonus*. Air-bladder large, simple. Stomach cæcal, slightly more muscular in its cardiac and pyloric portions than in the middle. *Pyloric appendages none*. Intestinal tract of moderate length, one-half longer than the entire fish. Peritoneum of a deep black colour. Both our examples are unfortunately males, so that the condition of the ovaries and oviduct is still unknown: it seems that the testicle is developed on the left side only, where it forms a long, broad, and very thin lamina; a vas deferens connects this lamina with another smaller one situated in the hindmost part of the abdominal cavity. Urogenital orifice with a very small and short tube.

It is evident from this description that the union of *Haplochiton* and *Prototroctes* in one family is perfectly justified, although the pre-

* They were in the first instance (Nov. 1869) sent by the Westland Naturalists' Society of New Zealand to Mr. Buckland, who eventually requested me to give an opinion about them.

sence of the pseudobranchiæ cannot be retained among the family characters, and is limited to the former genus. *Prototroctes* stands in the same relation to *Haplochiton* as *Coregonus* does to *Salmo*; and however the *Haplochitonidæ* may differ from the *Salmonidæ* in the structure of the jaws and intestinal tract, it is a most remarkable fact that the fresh waters of the southern hemisphere are inhabited by two genera with adipose fins, so extremely similar in outward appearance to the northern Salmonoids.

The species from Southern Australia is called *Prototroctes maræna*, and distinguished by having about eighty transverse series of scales along the body. The second species, from New Zealand, is very closely allied to it, but more elongate and having smaller scales. D. 12. A. 19. Transverse series of scales 100. The height of the body is nearly one-fifth of the total length (without caudal); the head is as small as in the other species, its length being contained six and a half times in the total (without caudal); the same uniform coloration as in *Coregonus*. For this species I propose the name of *Prototroctes oxyrhynchus*.

The fish were sent with the denomination "Mountain-Trout;" therefore it appears that they inhabit the fresh waters of the mountainous interior of New Zealand. The stomach and intestines were crammed full of a clayey mud, which may have been taken in on account of nutritive matter contained in it, or which may be the remnants of worms which had fed on mud.

7. Supplementary Notice on the Genus *Idiops*.

By the Rev. O. P. CAMBRIDGE.

(Plate VIII.)

Since writing the communication upon the genus *Idiops* read at the Society's Meeting on the 10th ult.*, I have discovered, in the collection of Arachnida at the British Museum, three additional undescribed species—one from the same locality as that from which *Idiops sigillatus* was received (Swan River, Australia), the two others from Africa (one from its eastern the other from its southern portion) The distribution of this genus thus appears to be exceedingly wide, comprising Syria, different parts of South America, Africa, and Australia.

The following are the descriptions that I have been enabled to make of these additional species:—

IDIOPS MEADII, n sp. (Plate VIII. fig. 4.)

Male adult: length 10 lines; length of cephalothorax 6 lines, breadth of ditto 4¾ lines.

The whole of this Spider, except the abdomen, is of a deep and somewhat bistre-brown colour. The *cephalothorax* is of a broad

* See *antea*, p. 101.

oval form, truncate before, and depressed above; the hinder portion of the caput is very slightly raised, and the normal furrows and indentations are strongly marked; the furrow denoting the junction of the caput and thoracic segment is very deeply indented, and of a curved form, the curve directed backwards: the surface of the cephalothorax is finely, profusely, and almost wholly covered with minute tubercular granulations; it is otherwise destitute of clothing or armature.

The *eyes* are normal in number and position: they are placed on two slightly raised or tubercular elevations; one, immediately above the falces, is occupied by the two foremost eyes, the other (and larger one), at some distance behind the former, is occupied by the remaining six eyes: the two foremost eyes are about an eye's diameter above the lower margin of the clypeus; they are the largest of the eight, and are very near together (less than half an eye's diameter), but considerably removed from the two behind them, which form the second row; these are further apart than those of the foremost (or first) row, the four forming a narrow oblong figure, rather wider behind than before: the hindermost (or third) row is composed of four eyes, in a strongly curved transverse line, the curve directed backwards; the two central eyes of this row are the smallest of the eight, and are further apart from each other than each is from the lateral eye on its side.

Falces moderate in length and strength, prominent, and curved in profile; they are furnished towards their extremities, on the upperside, with bristly hairs, and a group of short, strong, black spines.

Legs strong, moderate in length, which is relatively 4, 1, 2, 3, 1 and 4 not differing much; they are sparingly furnished with hairs and bristles; and a few small black spines occupy the undersides of tibiæ, tarsi, and metatarsi; the tibiæ of the first pair are inordinately strong, enlarging gradually to their fore extremity, near which, on the inner side, is a strongish corneous enlargement; close in front of and beyond this is another of a similar but stronger and more marked character, and of an abruptly bent form: each tarsus ends with three curved claws; the two superior ones much the strongest, and pectinated at their base, the inferior one small and apparently destitute of pectinations.

Palpi strong, rather long, and furnished with bristly hairs; the *radial* is much longer than the cubital joint, and very tumid in its form, its hinder portion being almost globular. This joint has a prominence near the middle of its outer side armed with a row of short, strong, tooth-like black spines; the *digital* joint is short, and has a blunt-pointed prominence at its outer extremity, and some strong spines at its extremity on the upperside; the *palpal organs* are strong and prominent, consisting of a corneous lobe, elongated into a strong, *bent* (but not *twisted*) corneous apophysis, which diminishes in size to its extremity, where it is bifid, the lower limb of the bifid portion being much the longest, and curved, the upper one very slight, but both sharp-pointed.

Maxillæ strong, divergent, with a rudimentary point or prominence at their extremities on the inner side. The *labium* and *sternum* present no deviation from the normal structure.

The *abdomen* is small, very convex above, and projects a little over the base of the cephalothorax; it is of a deep but dull brown colour, and very sparingly furnished with hairs; the spiracular plates (four in number) are large, and similar to the legs in colour: the abdomen was a good deal shrunken in behind, so that it was not easy to get a full view of the spinners; but their number was four, and those of the superior pair appeared to be much longer and stronger than those of the inferior.

The example (an adult female) from which the above description was made is in the British-Museum collection; it was captured by the late Captain Speke (in East Africa) during his expedition to the sources of the Nile, and presented to the British Museum by Earl Russell. It is nearly allied to *Idiops sigillatus*, which it resembles in the general form of the palpi; but it may at once be distinguished from that genus by the entire absence of a spiny armature on the cephalothorax and abdomen, as well as by the want of the four peculiar seal-like markings so characteristic of the abdomen of *I. sigillatus*. It is with a strong and grateful remembrance of past assistance in the study of Spiders, that I give to this species the name of Mr. Meade, of Bradford, Yorkshire.

IDIOPS BLACKWALLII, n. sp. (Plate VIII. fig. 5.)

Male adult: length 11 lines; length of cephalothorax $5\frac{3}{4}$ lines, breadth of cephalothorax $5\frac{1}{2}$ lines.

This conspicuous Spider is of a deep black-brown colour, the cephalothorax and upperside of the abdomen being densely clothed with a silky adpressed pubescence of a silvery-white colour, offering a striking contrast to the dark (nearly black) colour of the legs and palpi; mingled with this pubescence, on the upperside of the abdomen, are hairs of a yellowish hue towards its fore part, and others of a brownish mouse-colour towards its hinder part: near the middle of the upperside there appeared to be a largish pale-yellow spot or patch; but this was not traceable with accuracy, owing to the shrunken state of the abdomen: the sides and under part melt gradually from the hue of the upperside into a deep mouse-brown: the spiracular plates (four in number, and glabrous) differ from each other in colour, those of the anterior pair being dark yellow-brown, while those of the posterior pair are of an orange-yellow colour.

The *cephalothorax* is depressed above (without any elevation of the occipital portion of the caput), and of a broad-oval form, narrowest in front, where it is less distinctly truncate, and proportionately rather narrower than in some other species; the hinder part is very broad, and indented on its posterior margin; the form of the cephalothorax is thus heart-shaped, blunt at its narrower end, and nearly resembles that of *Idiops kochii*.

The *eyes* are situated upon a single oval tubercular elevation, immediately above the fore margin of the caput. This elevation is furnished with some strong, curved, spine-like bristles before and behind. The grouping of the eyes is normal, though more compact than in *Idiops meadii* and *I. sigillatus*: the two forming the foremost row are close above the fore margin of the caput: those of the second row (also two in number) are the largest of the eight, and seated on the summit of the elevation; they are nearer together, though forming a rather longer row that the two foremost eyes: those of the third (or hinder) row are four in number, and small; they form two pairs, a pair occupying each extremity of the row; the eyes of each of these pairs are contiguous to each other, thus leaving a wide interval between the two pairs: those of the first and second rows form nearly a square, whose transverse diameter is rather shorter than its longitudinal, and its fore side the shortest.

The *legs* are very strong, and moderately long, their relative length being 4, 1, 2, 3; the difference between 1, 2, and 3 is slight; the actual lengths of 4 and 1 are 20 and 15 lines respectively: they are thickly clothed with brown-black hairs and inconspicuous spines: the metatarsi and tarsi are furnished beneath with pads of close-set hairs; those on the tarsi are peculiarly arranged, leaving a longish narrow oval hollow along the centre of the pad: the tibiæ of the first pair are armed at their extremity, rather underneath on the inner side, with a strong, curved, corneous projection, terminating with spiny bristles and sharp tooth-like spines; just above this projection is a short, strongish, tooth-like spine, which in this species occupies a position similar to that occupied in *Idiops meadii* by a second corneous process.

The *palpi* are moderately long, strong, and furnished, like the legs, with hairs and spines: the *radial* joint is longer, but not stronger than the *cubital*; it is furnished thickly, and very conspicuously beneath, with long hairs and spines: the *digital* joint has a pad or tuft of close-set hairs at its extremity; and the *palpal organs* consist of a nearly circular corneous bulb, prolonged in a slightly tortuous form, and terminating with two points, of which one is longer than the other and curved. These organs bear considerable resemblance to those of *Dysdera erythrina* (Walck.).

The *falces* have their profile abruptly curved; they are prominent, but moderate in length and strength, of a dark colour, and thickly furnished with mouse-grey hairs, among which are a few of a blackish hue; the extremities have no spines on their uppersides; and the hairs are so arranged as to form, with the dark ground, longitudinal bands or stripes.

The *maxillæ* are long and cylindrical, but have a protuberant point at their inner extremities; they are furnished on the inner sides with a fringe of strong bright-reddish hairs.

Labium small, oblong, rounded at its apex.

Sternum small, narrow-oval, very little wider behind than before.

The spinners were hidden beneath the dense hairy covering of that portion of the abdomen.

This fine and distinct species is described from a specimen in the British-Museum collection, received from the Swan River, Australia. In its general form and character it mostly resembles *Idiops kochii* (a native of South America); but it may readily be distinguished from all yet known species of the genus by the striking contrast of its colours. The specific name conferred upon it needs no explanation to those who are aware of Mr. John Blackwall's long and unwearied labours in the field of araneological science.

IDIOPS THORELLII, n. sp. (Plate VIII. fig. 6.)

Male adult: length 4½ lines; length of cephalothorax 2½ lines, breadth of cephalothorax 2 lines.

The fore part (including the legs and palpi) of this Spider is of an orange-yellow-brown colour; it is very sparingly furnished with hairs, and the legs have a few fine spines. The abdomen is dark yellow-brown; the form of the cephalothorax is a broad but regular oval, depressed above; the normal furrows and indentations are fairly marked. The *eyes* are seated in the normal position upon two tubercular elevations, as in *Idiops meadii*; the two which form the first row are the largest of the eight, and very near together; they are situated close above the frontal margin, and form, with those of the second row, a narrow oblong figure, whose hinder width is the greatest; the two intermediate eyes of the hinder row are the smallest of the eight, and much further from each other than each is from the end one on its side. The *falces* are moderate in length and strength, and are armed with a group of strongish spines near their extremities on the upperside. The *palpi* are long and strong: the *radial joint* is very strong, longer than the cubital, and tumid behind; it has a prominence on the middle of the outer side, armed with small tooth-like spines; near the outer extremity of this joint is another prominence, smaller, but similarly armed: the palpal organs consist of a large, globular, corneous lobe, prolonged into a not very large, nor very long-pointed, curved, beak-like projection: the form of the maxillæ and labium is normal; but the sternum is of a somewhat pentagonal form, moderate in size, and broader behind than before. The *legs* are moderate in length and strength; their relative length is 4, 1, 2, 3; the tibiæ of the first pair have two corneous projections near their extremities on the inner side; and each tarsus terminates with three claws, of which the two superior ones are pectinated, and the inferior one much the smallest.

A single example of this species is in the British-Museum collection.

Hab. South Africa. Its small size, as well as its colours and structure, will readily distinguish it from others of the genus. The specific name given to it is that of Dr. T. Thorell, Adj. Prof. Zool. Univ. Upsaliæ, and a distinguished araneologist.

DESCRIPTION OF PLATE VIII.

Fig. 1. *Idiops kochii*, ♂, p. 103.
- *a*. Fore-right view of cephalothorax and falces.
- *b*, *c*. Palpus in two positions.
- *d*. Profile, without legs or palpi.
- *e*. Natural length of Spider.

2. *Idiops sigillatus*, ♂, p. 105.
- *a*. Fore-right view of cephalothorax and falces.
- *b*. Underside of cephalothorax, showing maxillæ, labium, and sternum.
- *c*, *e*. Palpus in two positions.
- *d*. Leg of first pair.
- *f*. Hinder portion of abdomen.
- *g*. Profile, without legs or palpi.
- *h*. Natural length of Spider.

3. *Idiops syriacus*, ♀, p. 107.
- *a*. Fore-right view of cephalothorax and falces.
- *b*. Profile, without legs or palpi.
- *c*. Natural length of Spider.

4. *Idiops meadii*, ♂, p. 152.
- *a*. Fore-right view of cephalothorax and falces.
- *b*, *c*. Palpus in two positions.
- *d*. Leg of first pair.
- *e*. Profile, without legs or palpi.

5. *Idiops blackwallii*, ♂, p. 154.
- *a*. Fore-right view of cephalothorax and falces.
- *b*, *c*. Palpus in two positions.
- *d*. Leg of first pair.
- *e*. Profile, without legs or palpi.
- *f*. Underside of tarsus and metatarsus.

6. *Idiops thorellii*, ♂, p. 156.
- *a*. Leg of first pair.
- *b*. Fore-right view of cephalothorax and falces.
- *c*, *e*. Palpus in two positions.
- *d*. Tarsal claws.
- *f*. Natural length of Spider.
- *g*. Profile, without legs or palpi.

March 24, 1870.

Dr. E. Hamilton, V.P., in the Chair.

Mr. P. L. Sclater exhibited a coloured drawing, forwarded to him by Dr. S. Salvadori of Turin, C.M.Z.S., representing a bird which that naturalist had proposed to describe as a new genus and species of Megapodes, but which was evidently the remarkable Pigeon recently named by Mr. Gould *Otidiphaps nobilis* (Ann. N. H. 4th series, vol. v. p. 62, 1870; *cf.* P. Z. S. *antea*, p. 4). Dr. Salvadori had received the specimen in a box of skins bought at Singapore, but stated to have been brought from Macassar. All the other birds in this box (fifty-eight in number, belonging to forty different

species) were well-known inhabitants of New Guinea and the neighbouring islands, with the single exception of *Erythrura trichroa* (Kittl.), not hitherto recorded as a Papuan species.

A third letter* on the ornithology of Buenos Ayres, addressed to the Secretary by Mr. W. H. Hudson, C.M.Z.S., was read:—

"There are four Woodpeckers met with in this country [Buenos Ayres]. Two of these (*Picus mixtus* and *Chrysoptilus chlorozostus*) you have seen in my collections. To both these birds the natives have given the vulgar name 'Come-palo,' or 'Woodeater.' Both of these species are quite common in the places they frequent, and are occasionally seen in the thickets south of the Rio Salado; but this is the extreme southern limit of their range, and they prefer the Sayus forests bordering on the Rio de la Plata. *Chrysoptilus chlorozostus* is sometimes seen to alight on the ground, apparently for the purpose of feeding on worms and ants. Its cries are, when the bird is excited, loud, rapid, and shrill; at other times it modulates them to notes exceedingly soft and sorrowful.

"The third species (the *Carpintero blanco*, or White Carpenter†) affords another illustration of the influence of the riverine wood in introducing new species from the north to this country; for this bird, which is a native of the northern states of La Plata, is occasionally found within a few miles of the city of Buenos Ayres, though never, to my knowledge, south of it. Probably the divergence from the typical mottled colours of the Woodpeckers is greater in this species than in any other. I am not acquainted with its habits.

"The fourth species is the '*Carpintero*;' more widely distributed and better known than the other members of the genus to which it belongs, and also of great interest in reference to the erroneous account of its habits in Mr. Darwin's work, which makes it worthy of particular attention. However close an observer a naturalist may be, it is not possible for him to know much of a species from seeing perhaps one or two individuals in the course of a rapid ride across the pampas. Certainly, if Mr. Darwin had truly known the habits of the bird, he would not have attempted to adduce from it an argument in favour of his theory of the origin of species. In Chap. VI. of his well-known work on this subject the author speaks of the altered habits, caused by change of habitat and other extraneous circumstances, and infers that it would be an easy matter for natural selection to step in and alter an animal's structure so as to make a new species of it, after its habits have been so altered. He then proceeds to ask whether 'there can be a more striking instance of adaptation given than that of a Woodpecker for climbing trees and for seizing the insects in the chinks of the bark;' and, in reference to this, states that there is a Woodpecker inhabiting the plains of La Plata, 'where not a tree grows,' and which is conse-

* For Mr. Hudson's previous letters see *antea*, p. 87 et p. 108.

† [*Leuconerpes dominicanus*.—P. L. S.]

quently a 'Woodpecker which never climbs a tree' (Origin of Species, 4th ed. ch. vi. pp. 212, 213).

"The perusal of the passage quoted by one acquainted with the bird referred to and its habits might induce him to believe that the author had purposely wrested the truth in order to prove his theory; but as Mr. Darwin's 'Researches' were written long before the theory of natural selection was conceived, and abound in similar misstatements when treating of this country, the error must be attributed to other causes. The facts are, that besides orchards, and groves of willow, poplar, &c., which have been planted wherever the plains are settled, there is also the continuous wood, which I have already described, growing on the shores of the La Plata.

"South of Salado River the numbers of wild trees have given a name to a large department of this province. There is also in the vicinity of Dolores, 150 miles south of Buenos Ayres city, a very extensive forest. All these woods are frequented by the *Carpintero*, where he may be observed climbing the trees, resting on his stiff and frayed tail-feathers, and boring the bark with his bill as other Woodpeckers do. But his favourite resort is to the solitary *Ombu*, a tree found over a great extent of the plains of Buenos Ayres. This tree attains a considerable size; there is one situated within fifty paces of the room I am writing in that has a trunk which measures at a height of 3 feet above the ground 30 feet in circumference. This very tree was for years a breeding-place for several *Carpinteros*, and still exhibits on its trunk and larger branches scars of old wounds inflicted by their bills. The wood of the *Ombu* is very soft; and the *Carpintero* invariably bores for breeding where it is green and sound. The hole it forms runs horizontally about 9 inches into the tree, then slants upward a few inches more, and at the end of this passage a round chamber is excavated to receive the eggs.

"The *Carpintero* frequently lights on the ground, where it is seen to feed on ants and larvæ, and is sometimes found several miles distant from any trees. This, however, is very rare; and it is on such occasions always apparently on its way to some tree or trees in the distance. It very rarely takes a long flight, but travels by very easy stages. These circumstances have led to its being described as living exclusively on the ground. Outlying the regions abounding in trees, and which I have described as the habitat of the *Carpintero*, there are vast tracts in the southern and western portions of Buenos Ayres where, in truth, 'not a tree grows;' but in these regions the *Carpintero* is never seen. It is not only the erroneous account of this bird's habits that makes Mr. Darwin's mention of it peculiarly unfortunate, but also because this bird rather affords an argument against the truth of Mr. Darwin's hypothesis. Mr. Darwin describes it as a perfect Woodpecker, not only in conformation, but in its colouring, undulatory flight, and shrill obstreperous cries. It is plain, then, that natural selection has left it unaltered; and is it not reasonable to suppose that, if there was such an agency in nature, it would have done something to alter this species, placed as it is in a

situation so badly adapted for its structure and habits? But, in truth, natural selection has done absolutely nothing for our Woodpecker. Its colours are not dimmed, nor its loud notes subdued; but even when it traverses the open country it calls about it the enemies from which it has little chance to escape. Natural selection has not endowed it, for its safety, with the instinct of concealment, so common in the true pampas birds. Its peculiar flight also, so admirably adapted for gliding through the forest, here only excites the rapacious birds to pursuit. In fact, the residence of this species in a region of which the conditions seem inimical to its preservation, so far from modifying, seems rather to have intensified its characteristics. Compared with the other Woodpeckers of this portion of South America, in structure, size, colour, voice, and flight, it is the type of the genus. The habit of occasionally perching on the ground it possesses in common with other species; but it never roosts on the ground, like the true pampas birds; never builds a nest or burrows in banks, like the Patagonian Parrot; nor ventures on to those vast and treeless plains that border on its habitat. Scarcity of provisions and seeking for trees better adapted for breeding, with, perhaps, other reasons, have probably led to the distribution of this species over a great extent of country.

"Twenty years ago, which is as far back as my recollection extends, the *Carpintero* was rather a common bird; but it has now become so very rare, that for the last four years I have met with only three individuals."

Mr. Tegetmeier exhibited living specimens of the Axolotl (*Siredon mexicanus*), one of which (fig. 1, p. 161) had undergone the metamorphosis described by M. Aug. Duméril in the 'Annales des Sciences Naturelles' for 1867.

This animal had hitherto been regarded as a perennibranchiate amphibian, as it breeds freely in the larval state, and in Mexico appears to be only known in that condition, although many naturalists have suspected it to be the larva of a large Salamander.

The specimens exhibited were hatched in the summer of 1868, and kept under similar conditions, without any change taking place beyond a steady increase of growth, during the succeeding winter and summer of 1869. In the autumn one only out of five began to change; the external gills disappeared, the jaws became much more pointed, and the skin assumed a singularly mottled appearance. The animal did not leave the water, but, when the temperature was warm, usually breathed by standing erect against the side of the aquarium and elevating the nostrils above the surface, respiration being effected by the very rapid movement of the skin of the lower jaw. During cold weather it usually remained submerged, rising at intervals to the surface to breathe.

Mr. Tegetmeier also exhibited some microscopic slides, on which were mounted portions of the excessively thin cuticle of the feet of the animals, that had been shed like a glove, the skin of the toes being partly inverted.

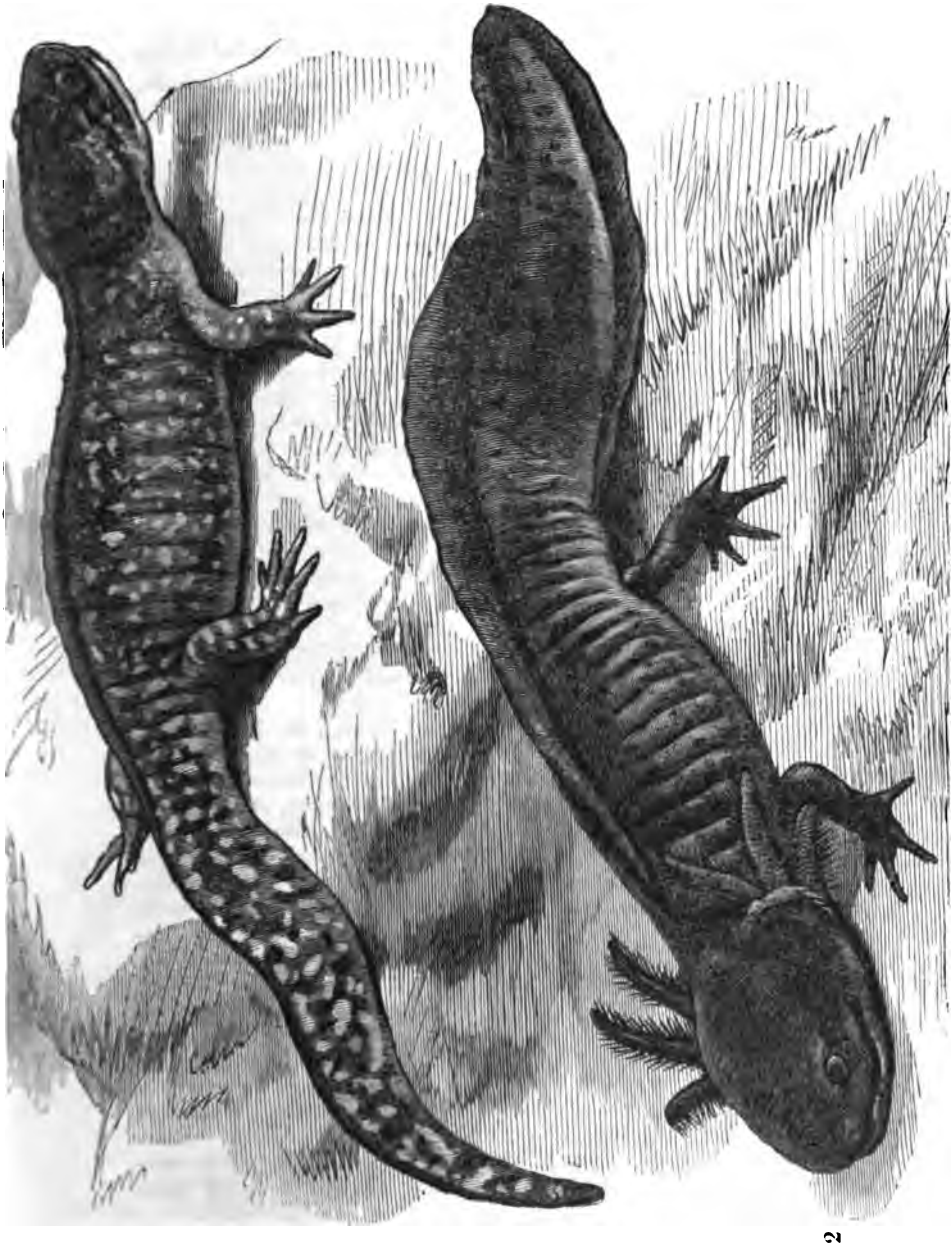


Fig. 1. *Siredon mexicanus*, metamorposed.

Fig. 2. *Siredon mexicanus*, in normal state.

The following papers were read:—

1. Notice of the arrival in the Society's Gardens of living Specimens of two newly described Species of *Phasianidæ*. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

(Plates XIV., XV.)

Since the last Meeting, the Society's collection of living Phasianidæ has been enriched by the acquisition of the original typical specimens of two very fine species of the genera *Lophophorus* and *Ceriornis*, which have been lately described as new by Dr. Jerdon. The discovery of these remarkable additions to the list of known Pheasants is a matter of so much interest that I venture to offer to the Meeting a few remarks upon the subject, in connexion with the drawings of these splendid birds which I now exhibit.

In October last Dr. T. C. Jerdon, the well-known Indian naturalist, addressed to me a letter from Shillong, a new sanitarium on the Khasya Hills in Upper Assam, stating that he had obtained from the hill-ranges in the neighbourhood of Suddya a skin of a Tragopan (*Ceriornis*), distinct from either of the well-known Indian species, but which he believed might be *C. temminckii* of China, and had seen a living example of an Impeyan from the same Hills, which he regarded as probably new to science, and proposed to call *Lophophorus sclateri*. This letter was accompanied by an enclosure upon the same subject for publication in 'The Ibis,' which was duly forwarded to the editor of that journal, and appeared in the last number*.

In a subsequent communication, received through Dr. J. Anderson, our excellent correspondent and honorary agent at Calcutta, Dr. Jerdon informed me that, in the interests of the Society, he had begged of Major Montagu, of the Bengal Staff Corps, the fortunate possessor of the new Impeyan, the living bird in question, as also a living example of the so-called *Ceriornis temminckii*, in the same gentleman's possession, and had forwarded them to Calcutta to Dr. Anderson for transmission to the Society. Dr. Jerdon likewise stated that, since he last wrote, having had an opportunity of consulting authorities, he had convinced himself that the *Ceriornis* was distinct from *C. temminckii*, and, in a notice sent to the 'Journal of the Asiatic Society of Bengal,' had proposed to call it *Ceriornis blythii*.

It is to Major Montagu, therefore, that the Society are primarily indebted for these two splendid birds, which reached us in safety on the 12th inst., though our best thanks are likewise due to Dr. Jerdon and Dr. Anderson for their kind assistance in the matter, and to Mr. William Jamrach, who most liberally undertook to convey them home, under his personal care, and has delivered them to us in excellent condition.

* See 'Ibis,' 1870, p. 147, and J. A. S. B. 1870, p. 61.



J. Wolf Kerlemans lith.

M & N. Hanhart imp.

LOPHOPHORUS SCLATERI.



J. G. Keulemans lith. M. & N. Hanhart imp.

CERIORNIS BLYTHII

The new Impeyan *Lophophorus sclateri*, as will be seen by the figure which I now exhibit (Plate XIV.), is at once distinguishable from the *L. impeyanus* of the Himalayas, as also from the more recently discovered *L. l'huysi** of Szechuen by well-marked characters. The sides of the head are widely naked, and covered with bright blue skin. The top of the head is covered with short curly feathers of a bright green; and there is no appearance at all of the remarkable crest whence the genus has obtained its name, though it is just possible that this may be developed at a later period, for other indications lead me to believe that our specimen is not quite adult. The general colour of the plumage is velvety black, above glossed with green, and with coppery on the nape and wing-coverts. The lower back and upper tail-coverts are pure white, with some longitudinal black shaft-streaks. The tail-feathers are dark chestnut, terminated, I believe, by a narrow white end-band—although this is not distinguishable in our specimen, from the imperfect state of the tail; but it is mentioned by Dr. Jerdon, and there were some indications of it when the example first arrived. The bill is long and curved, and the feet large, as in the other Impeyans. The beak is of a yellowish horn-colour, the legs and feet dark horn-colour, the irides dark brown.

There can be no doubt, I think, that the present bird belongs to a species perfectly distinct from the two previously known members of the genus, and forms a third of this magnificent group of Phasianidæ.

Our example of this bird, which is the only individual of the species yet obtained, was received from the Mishmi Hills in Upper Assam, the same locality that has produced the remarkable mammal *Budorcas taxicolor*.

Not less easily distinguishable from its congeners hitherto known is *Ceriornis blythii*, of which I likewise exhibit a figure (Plate XV.). Amongst the described species of the genus it most nearly resembles *Ceriornis caboti*, being below mesially of a nearly uniform colour, somewhat as that species, and not distinctly ocellated as in the three other members of the genus. It is, however, to be recognized at first sight by the splendid golden yellow of the naked face and throat. It is not very easy to describe a living bird with accuracy; but no description of this species having yet appeared in this country, I have drawn up the subjoined diagnosis, which may be useful, until an opportunity occurs of making a better one.

CERIORNIS BLYTHII. (Plate XV.)

Ceriornis temminckii, Jerdon, Ibis, 1869, p. 147.
Ceriornis blythii, ej. J. A. S. B. 1870, p. 60.

Supra rubescenti-brunneus, nigro variegatus et albo ocellatus, capite, collo undique et pectore aurantiaco-castaneis: vitta verticali lata et fascia utrinque auriculari nigris: facie et gula nuda splendide aureis, hac in parte inferiore nitide viride-

* For notice and figure of this species see P. Z. S. 1868, p. 1, pl. 1.

scente, inde a pectore linea nigra divisa : abdomine cineraceo-fusco, obsolete variegato, hypochondriis albo ocellatis : tectricibus alarum et tibiis imis castaneis : cauda intus lacteo-alba nigro terminata, extus fusca : rostro (in ave viva) nigro, pedibus rubido-carneis : iride obscure brunnea : crassitie fere specierum reliquarum.

Hab. in Assamiâ superiore (*Jerdon*).

Vivario. Soc. Zool. Londinensis.

The present bird will therefore form a fifth member of the genus *Ceriornis*, of which the species now known to science will stand as follows :—

1. CERIORNIS SATYRA (Gould, B. Asia, pt. xx.).

Hab. Southern slopes of the Himalayas of Nepaul, Sikim, and Bhotan, at an elevation of from 6000 to 9000 feet.

Pairs of this Tragopan were first received by the Society in 1863. They bred in the Gardens in 1864 and the following years, and we had good hopes of their becoming permanent denizens of our aviaries*; but, I am sorry to say, these expectations have not been fulfilled, and we have since lost the whole of these birds. Nor, I believe, have the sister societies on the Continent been more successful in the present case.

2. CERIORNIS MELANOCEPHALA (Gould, B. Asia, pt. vii.).

Hab. Southern slopes of North-western Himalayas, at an elevation of from 6000 to 9000 feet, Kumaon, Gurwhal, and Cashmere.

3. CERIORNIS TEMMINCKII (Gould, B. Asia, pt. xxi.).

Hab. Hills of Eastern and Northern Szechuen, extending thence into Central China.

Monseigneur Chauveau sent skins of this *Ceriornis* from the hills above Ta-kien-liou along with those of *Lophophorus l'huysi* and *Ithaginis geoffroyi* (Bull. Soc. Accl. 1867, p. 705). Living examples were likewise obtained by Mr. Medhurst to the north of Hankow along with those of Reeves's Pheasant.

4. CERIORNIS CABOTI (Gould, B. Asia, pt. x.).

Hab. Hills of Quang-sze, Southern China.

The original specimen of this bird was obtained at Macao, and for some years was the only individual known of the species. Mr. Swinhoe subsequently purchased a living example in a bird-shop at Hong-kong (see 'Ibis,' 1865, p. 350), and has reason to believe it was brought down the Hong-kiang, or West River, from the hills of the interior of Quang-sze, where there is a fine unexplored country.

5. CERIORNIS BLYTHII.

Hab. Hills of Upper Assam, at the head of the valley (*Jerdon*).

* *Cf.* Wolf & Sclater, Zoological Sketches, ii. pl. xxxix.

2. Further Notes on the Cuckoos of the Genus *Coccyzus*.

By P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

In an article "On the Species of the American Genus *Coccyzus*," published in this Society's 'Proceedings for 1864 (p. 119 *et seqq.*), I separated from *Coccyzus americanus* a Jamaican specimen, under the name of *C. bairdi*, distinguishing it by the absence of rufous colour on the outer wing-margins, smaller size, purer white colour below, and other minor differences. Since that time Mr. W. T. March, so well known by his excellent notes on the birds of Jamaica *, has kindly sent me several skins of the *Coccyzus americanus* of that island for comparison, and I have also obtained other specimens of this bird from various localities. After carefully examining all these, I have come to the conclusion that *C. bairdi* is not tenable as a species, the skin on which it was founded being in fact merely an individual variety of *C. americanus*.

I have also been lately able to compare together a larger series of the two "Mangrove Cuckoos," *Coccyzus seniculus* sive *minor* and *C. nesiotes*, than I had formerly been able to examine, and am now of opinion that the latter so-called species of Cabanis and Heine is not fairly separable from the former.

This reduces the number of species of *Coccyzus*, as given in my list (P. Z. S. 1864, p. 120), by two. On the other hand we must add *Coccyzus cinereus* of Vieillot, of which, as already stated in these Proceedings†, I have lately examined several specimens, and which proves to be a most distinct species, and *Coccyzus ferrugineus* of Gould, which was omitted in my former list. This raises the total number of valid species to eight again, which may be arranged as follows:—

A. Species cauda valde graduata; mandibula ad basin flava.
  a. Supra pallide cinerei unicolores.
    a'. Infra albus ..... 1. *americanus*.
    b'. Infra ochraceus ..... 2. *minor*.
  b. Supra rufus: pileo cinereo ..... 3. *ferrugineus*.
B. Species cauda valde graduata; rostro nigro.
  a. Supra fusci.
    a'. Pileo concolori: subtus albus ..... 4. *erythrophthalmus*.
    b'. Pileo cinereo: subtus ochraceus ..... 5. *melanocoryphus*.
  b. Supra subtusque rufus: pileo plumbeo ..... 6. *landsbergi*.
C. Species cauda fere æquali: rostro nigro.
  a. Pectore pallide cinereo ..... 7. *cinereus*.
  b. Pectore læte rufo ..... 8. *pumilus*.

1. COCCYZUS AMERICANUS.

Cuculus americanus, Linn. S. N. i. p. 170.
Cuculus carolinensis, Wils. Am. Orn. iv. p. 13, pl. 28. f. 1.
Coccyzus pyrrhopterus, Vieill. Enc. Méth. p. 1343.

* Proc. Acad. Sc. Phil. 1863, pp. 150 et 283.
† P. Z. S. 1869, p. 633.

Coccyzus americanus, Bp. Consp. p. 111; Gosse, B. Jam. p. 279; Scl. et Salv. Ibis, 1860, p. 43; Gundlach, Rep. F. N. i. p. 295; Sclater, P. Z. S. 1860, p. 252, 1864, p. 120; Newton, Ibis, 1859, p. 149; Léotaud, Ois. de Trin. p. 350.

Coccygus americanus, Baird, B. N. Am. p. 76; Cab. J. f. O. 1862, p. 167; Cab. et Hein. Mus. Hein. iv. p. 75.

Coccyzus dominicus, Baird, Proc. Ac. Phil. 1863, p. 64.

Coccyzus bairdi, Sclater, P. Z. S. 1864, p. 120; Pelzeln, Orn. Bras. p. 273.

Supra fuscus, fronte cinerascente: remigibus intus rufis: subtus albus: rectricibus lateralibus nigris albo late terminatis, duabus mediis dorso concoloribus: rostro superiore nigro, inferiore ad basin aurantiaco: long. tota 11, *alæ* 5·5, *caudæ rectr. med.* 5·8, *ext.* 3·5 *poll. Angl.*

Hab. North America, Eastern States to Missouri plains (*Baird*); Mexico, Orizaba (*Sallé*); Cuba (*Gundlach*); Jamaica (*Gosse & March*); Ste. Croix (*Newton*); Trinidad (*Léotaud*); Guatemala (*Salvin*); Costa Rica (*v. Frantzius*); Panama (*M'Cleannan*); Bogota (*Mus. P. L. S.*); S. Paulo, Brazil (*Natt.*).

I have examples of this species in my collection from the United States, Mexico, Jamaica, and Bogota. In Salvin and Godman's collection are others, from the United States, Guatemala, and Panama. I have also compared those in the British Museum from various localites.

The rufous colour of the primaries does not always extend through to the outer webs, but varies in amount. In the skin which I called *bairdi* (supposing it to be the *dominicus*, Baird *nec* auct.) it does not show on the outer web at all.

I have a "Bogota" skin certainly referable to this species, so that it may probably straggle further south occasionally, and may be the species called by Pelzeln *C. bairdi* (Orn. Bras. p. 273), which was obtained by Natterer in the province of S. Paul, S.E. Brazil.

2. COCCYZUS MINOR.

Coucou des Paletuviers de Cayenne, Buff. Pl. Enl. 813.

Cuculus minor, Gm. S. N. i. p. 411.

Cuculus seniculus, Lath. Ind. Orn. i. p. 219.

Coccyzus seniculus, Vieill. Enc. Méth. p. 1346; Sclater, Cat. Am. B. p. 323; Taylor, Ibis, 1864, p. 170; Gosse, B. Jam. p. 281; Newton, Ibis, 1859, p. 150; Sallé, P. Z. S. 1857, p. 234; Sclater, P. Z. S. 1861, p. 79, et 1864, p. 121; Cab. et Hein. Mus. Hein. iv. p. 78; Pelz. Orn. Bras. p. 273.

Coccyzus helviventris, Cab. in Schomb. Guian. iii. p. 714.

Coccygus minor, Baird, B. N. Am. p. 78; Gundlach, Rep. F. N. i. p. 295.

Coccyzus dominicus, Sclater, Cat. Am. B. p. 323.

Coccyzus nesiotes, Cab. et Hein. Mus. Hein. iv. p. 78; Taylor, Ibis, 1864, p. 170; Sclater, P. Z. S. 1864, p. 121.

Coccyzus minor, Léotaud, Ois. de Trin. p. 353; Bryant, Pr. Boston Soc. N. H. x. p. 254, xi. p. 96.

Supra fuscus, fronte cinerascente : regione auriculari nigricante : subtus pallide fulvus : rectricibus lateralibus nigris, albo late terminatis, mediis duabus dorso concoloribus : rostro superiore nigro, inferiore ad basin aurantiaco : long. tota 12, *alæ* 5·2, *caudæ rectr. med.* 6·2, *lat.* 3·7.

Hab. Florida (*Audubon*); Cuba (*Gundlach*); Jamaica (*Gosse*); S. Domingo (*Sallé*); Porto Rico (*Bryant*); Sta. Cruz (*Newton*); Dominica (*Taylor*); S. Lucia (*Mus. P. L. S.*); Guadeloupe et Martinique (*Mus. Paris*); Honduras (*Whitely*); Chiriqui (*Kellett, Mus. Brit.*); Trinidad (*Léotaud*); Cayenne (*Mus. Brit.*); Brit. Guiana (*Schomb.*); Cajutata near Pará (*Natt.*).

I have seven skins of this Cuckoo in my collection from Jamaica, S. Domingo, Porto Rico, Honduras, and S. Lucia. I have also examined those in the British Museum, from Chiriqui, Trinidad, and Cayenne, and am now of opinion that they are all referable to one species. For this we must employ the specific name *minor*, imposed by Gmelin upon Buffon's Pl. Enl. 813, which unmistakably represents the species.

When I wrote my American catalogue I was inclined to believe there might be two allied species of this form—an insular one, which I then termed *dominicus*, and a continental one, distinguishable principally by its thicker bill, which I considered to be the true *minor* (sive *seniculus*). In my paper on the genus, written in 1864, I retained this view, merely adopting for the species previously termed *dominicus* the name *nesiotes*, under which Cabanis and Heine had then described it.

Having now had an opportunity of examining more specimens, I have come to the conclusion that there are no sufficient grounds for maintaining these two supposed species as distinct. The differences consist chiefly in general dimensions and size of the beak; but there is much variation in both these particulars. The type of Cabanis and Heine's *C. nesiotes*, as pointed out by Dr. Bryant (P. B. S. N. H. x. p. 255), is probably a young bird.

3. COCCYZUS FERRUGINEUS.

Coccyzus ferrugineus, Gould, P. Z. S. 1843, p. 105, et Zool. Voy. Sulphur, p. 46, pl. 29; Bp. Consp. i. p. 97.

Nesococcyx ferrugineus, Cab. et Hein. Mus. Hein. iv. p. 79.

Rufus, pileo cineraceo : subtus pallide fulvus : alis extus rufis; caudæ rectricibus externis pallide fulvis, ad apicem albicantibus; proximis utrinque versus apicem nigricante brunneo subobsolete notatis, duabus mediis dorso concoloribus : rostro nigricante, mandibula ad basin flava : long. tota 10, *alæ* 5·2, *caudæ* 6.

Hab. Cocos Island, Pacific.

The typical specimen of this species is now in the British Museum, and is the only individual yet obtained, as far as I know, Cocos Island being far out of the track of ordinary collectors. The bird appears to me to be a true *Coccyzus*, though with somewhat of the rufous colouring of a *Piaya*. I have placed it in the yellow-billed

3. Descriptions of eight new Species of Shells from Australia and the Solomon Islands. By JAMES C. COX, M.D., C.M.Z.S.

(Plate XVI.)

1. HELIX RAINBIRDI, Cox. (Plate XVI. fig. 1.)

Shell deeply openly umbilicated, globosely turbinate, rather thin, faintly striated, dark chestnut-brown, almost black, ornamented by two broad dark yellow bands about the centre of the whorls, and one round the umbilicus, which is much excavated and broadly funnel-shaped; spire broadly conoid, obtuse; whorls 6½ to 7, convex, last deflected in front; aperture oblique, roundly lunate; lip dark and metallic at the margin, broadly expanded and somewhat reflected; margins approximating, joined by a thin callus; columellar margin much expanded, overhanging the broad, open, funnel-shaped umbilicus.

Hab. Mount Dryander, Port Denison, Queensland.

Diameter—greatest 1·75, least 1·20; height 1·35 inch.

This fine species, named after its discoverer, was sent to me as *Helix mitchellæ*, Cox, which in general appearance it much resembles; it is, however, easily distinguished by its less conical shape, and by its being openly umbilicated, whereas *H. mitchellæ* has a covered umbilicus.

2. HELIX THATCHERI, Cox. (Plate XVI. fig. 2.)

Shell deeply and openly umbilicated, depressedly globose, rather solid, finely obliquely striated, dull horny yellow, ornamented with a broad, dark chestnut band below the suture, with five or six fine dark lines round the centre of the whorls, and also a dark undefined zone round the umbilicus, which is of the same colour; this dark coloration extends across the last whorl in a broad undefined band along the margin of the aperture, and joins the band beneath the suture; spire flatly conoid; whorls 6½, flattened, the last becoming much inflated, rapidly enlarged and a little depressed in front; base flat; aperture oblong-oval, large, oblique, livid white within; lip slightly thickened and everted, of a lighter colour than the interior; margins approaching, joined by a thin dark callus; columellar margin much dilated, half concealing the umbilicus.

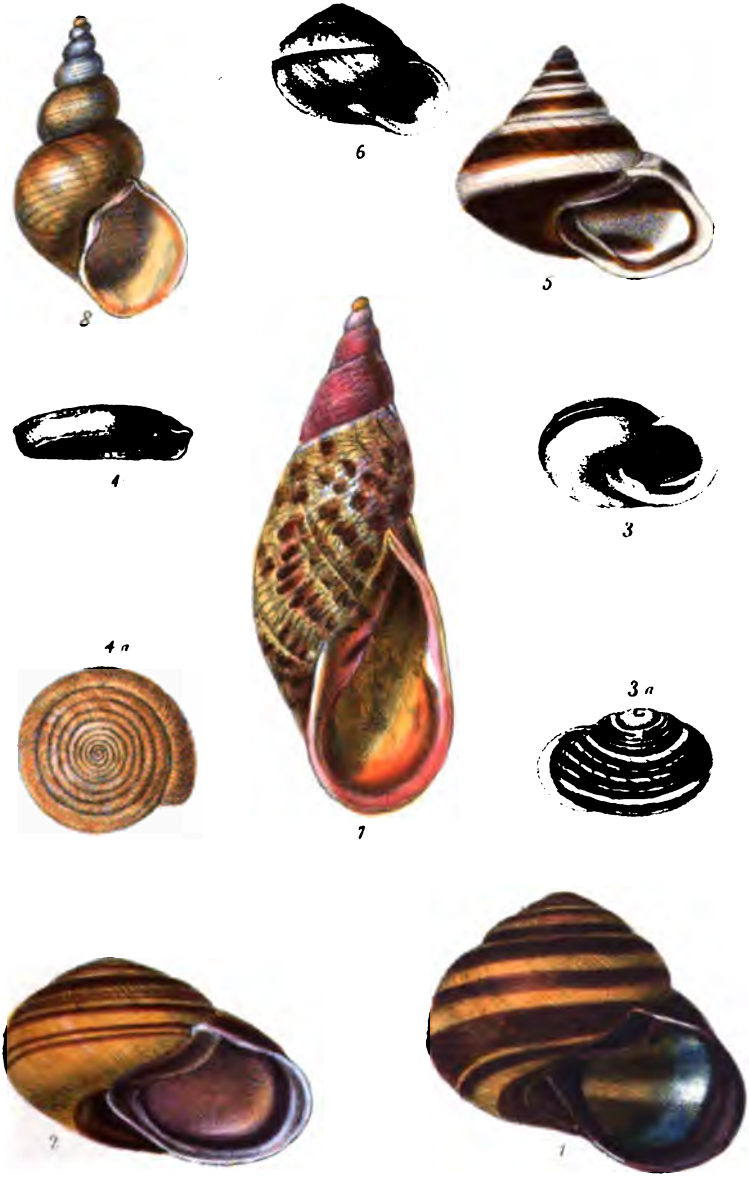
Hab. Mount Bersaker, Rockhampton, Queensland (*Rainbird*).

Diameter—greatest 1·60, least 1·20; height 1·15 inch.

An interesting species, of an intermediate form between *Helix appendiculata* and *H. incei*, but easily distinguished from either by the marked inflation of the last whorl.

3. HELIX NOVÆ-GEORGIENSIS, Cox. (Plate XVI. fig. 3.)

Shell imperforate, globosely depressed, surface corrugated and shiny, white, ornamented with 5 or 6 narrow brown bands; apex of spire bluntly rounded; whorls 4, rapidly increasing in size, each



C B Sowerby lith M & N Hanhart imp

NEW SHELLS FROM AUSTRALIA & SOLOMON ISLANDS.

flatly sloping to the centre, causing a subcarinated appearance; last whorl suddenly reflected in front, and contracted near the aperture; aperture very oblique, ear-shaped, margin ivory-white, flatly expanded, the brown bands on the last whorl abruptly terminating at the base of the expanded lip; margins approaching, joined by a thin callus; columellar margin slightly dilated, and inclining to be tuberculated within.

Hab. New Georgia, Solomon Isles.

Diameter—greatest 0·95, least 0·70; height 0·55 inch.

4. HELIX MACGREGORI, Cox. (Plate XVI. fig. 4.)

Shell very widely umbilicated, flatly discoidal, quite flat on the upper surface, widely excavated below, pale yellow brown; whorls 10 or 11, very slowly increasing, having a coiled-up appearance as in *H. polygyrata*, coarsely striated; last whorl keeled above, rounded below, slightly dilated and much deflected in front; suture margined; aperture very oblique, ovately rounded; lip with an irregular margin, very slightly thickened, not reflected.

Hab. New Ireland (*Brodie*).

Diameter—greatest 0·93, least 0·82; height 0·23 inch.

This species so much resembles the smaller varieties of *H. polygyrata* that it need not be mistaken for any other species; its coiled-up, money-like appearance would at once attract attention. I have named it in honour of my late friend Capt. MacGregor, who for several years was a most enthusiastic collector among the Solomon group of islands.

5. HELIX CHANCEI, Cox. (Plate XVI. fig. 5.)

Shell imperforate, conoid, faintly striated from above downwards with straight striæ, and longitudinally striated with more distinct wavy striæ, white, ornamented on the centre of the whorls with a broad brown band, and round the base with a broad brown zone; spire pyramidal, black at the apex; whorls six, the last rapidly increasing in size and inflated, suddenly deflected in front, and contracted behind the lip; aperture large, irregularly ovately rounded, margins approaching, lip slightly thickened and reflected; columellar margin moderately dilated and excavated, and darkened by a black callus.

Hab. Ysabel Island, Solomon Islands.

Diameter—greatest 1·30, least 1·07; height 1·25 inch.

This handsome species is an intermediate form between *Helix coniformis* of Férussac and *H. louisiadensis* of Forbes, but is of a more decidedly trochiform appearance.

6. HELIX CONVICTA. (Plate XVI. fig. 6.)

Shell imperforate, solid, orbicularly conoid, transversely faintly striated, and decussated with fine longitudinal striæ, pale yellowish white, ornamented with two narrow brown bands, one near the centre of the whorls, the other immediately below the suture, which is rather impressed; spire broadly conical, apex obtuse; whorls 6½,

gradually increasing in size, last depressed in front; aperture rotundately lunate; peristome white, expanded, margins slightly approaching; columellar margin ivory-white, triangularly expanded and fused into the body of the shell.

Diameter—greatest 0·90, least 0·73; height 0·74 inch.

Hab. Nichol Bay, Western Australia.

7. Bulimus san-christovalensis. (Plate XVI. fig. 7.)

Shell rimately perforate, conically ovate, club-shaped; spire elongated and proportionally slender, moderately thin, rather finely transversely malleated, pale brown, apex pink, abundantly and irregularly ornamented with triangular or irregular longitudinal zigzag markings; whorls 5, the last inflated and forming three-fourths the length of the shell; aperture elliptically oval; peristome pink, shortly expanded and very slightly thickened; columellar margin dilated and divided into two pillars—one, the larger and more highly coloured, prominent, and running spirally within the body of the shell, the second running forward toward the insertion of the opposite end of the peristome and becoming blended with a callus of union; in some specimens a tooth exists between the spiral internal pillar of the columella and the insertion of the opposite end of the peristome.

Diameter 1·20, length 1·60; aperture 1·45 long, 0·60 inch broad.

Hab. San Christoval, Solomon Islands.

8. Recluzia hargravesi*. (Plate XVI. fig. 8.)

Shell imperforate, pyriform, thin, scalariform, greenish horn-colour, shining, transversely obsoletely striated, and very indistinctly banded; whorls 6½–7, markedly rounded, and separated by a deep suture; aperture ovately rounded; peristome thin, simple; columellar margin thickened and expanded.

Hab. Miall River, Port Stephens, N.S.W.

Diameter—greatest 0·90, least 0·67; length 1·53; aperture 0·65 long, 0·50 inch wide.

DESCRIPTION OF PLATE XVI.

Fig. 1. *Helix rainbirdi*, p. 170.
2. *Helix thatcheri*, p. 170.
3, 3 *a*. *Helix novæ-georgiensis*, p. 170.
4, 4 *a*. *Helix macgregori*, p. 171.
5. *Helix chancei*, p. 171.
6. *Helix convicta*, p. 171.
7. *Bulimus san-christovalensis*, p. 172.
8. *Recluzia hargravesi*, p. 172.

* [Mr. H. Adams, who has been kind enough to look over this paper for Dr. Cox, remarks that this shell is pelagic, and was probably found at or near the mouth of the river, whither it had been driven by the winds from the sea.—Ed.]

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OF THE

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OF THE

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OF LONDON

FOR THE YEAR

1870.

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4. Note sur une nouvelle espèce de Pélican.

Par J. V. Barboza du Bocage, F.M.Z.S. &c.

Pelecanus sharpei, nov. sp.

Supra albus, collo imo, interscapulio et tergo vix roseo tinctis; subtus cinnamomeo lavatus, macula magna pectorali cinnamomeo-castanea; fronte valde tumida; plumis frontalibus angulum acutum antice formantibus; crista cervicali brevi, erecta; rostro flavo, medio et lateribus nigricantibus, apice marginibusque rubris; genis nudis rubentibus; sacco gulari virescenti-flavo; pedibus sordide carneis.

Hab. Angola.

Deux individus d'Afrique occidentale (Angola) en plumage de noces. Ils diffèrent beaucoup par la taille. Le plus grand dépasse en dimensions un exemplaire, qui existe au Muséum de Lisbonne, du *P. onocrotalus* ♂, provenant des mers d'Europe et acheté il y a longtemps à M. Verreaux ; l'autre a à peu près la taille de celui-ci.

Ils appartiennent évidemment par la disposition des plumes frontales à la *section* qui comprend *P. onocrotalus*, *P. mitratus*, et *P. javanicus* ; mais je crois impossible de les rapporter à aucune de ces espèces.

Le *P. onocrotalus* en est bien distinct par l'existence d'une crête occipitale pendante et par la teinte jaune-clair de la tache qui lui recouvre le jabot pendant la saison des amours.

Le *P. mitratus*, d'après Mr. Sclater, est facile à reconnaître par sa taille plus petite, à son plumage d'un blanc pur et à sa longue crête occipitale, caractères qui ne se retrouvent pas chez nos spécimens. En outre Mr. Jerdon (Birds of India, iii. p. 856) lui donne pendant l'époque des noces une tache jaune au jabot.

Quant au *P. javanicus*, Horsf., qui n'est pas généralement admis, Mr. Sclater le décrit, d'après Mr. Blyth, comme ne portant jamais de crête pendante à l'occiput ni de renflement au front, et ayant les couvertures alaires et les tertiaires liserées de noir, le bec d'un bleu livide et la tache pectorale d'un jaune foncé. À l'exception de l'absence de crête occipitale, tous les autres caractères ne conviennent pas à notre espèce.

Je profite de cette occasion pour rendre à Mr. Sharpe un témoignage public de mon admiration pour ses travaux, en lui dédiant cette espèce.

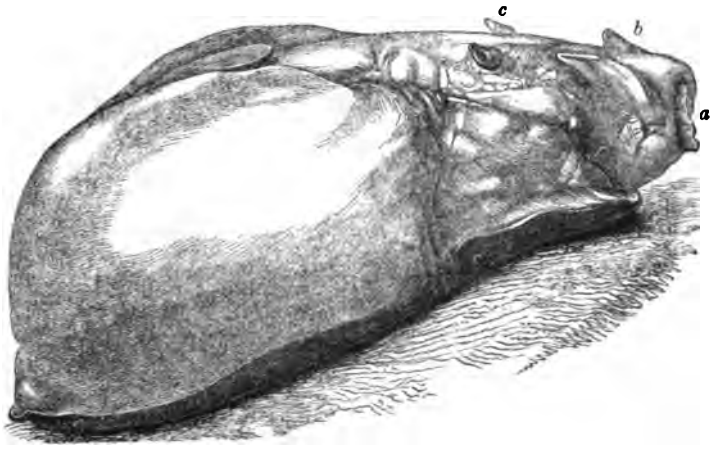
5. Description of a new British Mollusk, *Aplysia melanopus*.

By Jonathan Couch, F.L.S., C.M.Z.S.

A couple of molluscous animals were brought to me on the 3rd of January (1870), having been thrown on shore within the harbour of Polperro (on the east coast of Cornwall), in a severe storm. One of them was in a good state of preservation ; but the other was

greatly bruised and mutilated, and was thus deprived of the lively colours which the first possessed. As I have never seen the species before, I have judged these animals worthy of particular notice; and I think that the more perfect example is deserving of a minute

Fig. 1.



Aplysia melanopus, nat. size.

a, mouth; *b*, *c*, tentacles; *d*, reproductive organ (this and the eye scarcely visible in the woodcut); *e*, foot, of a dark colour.

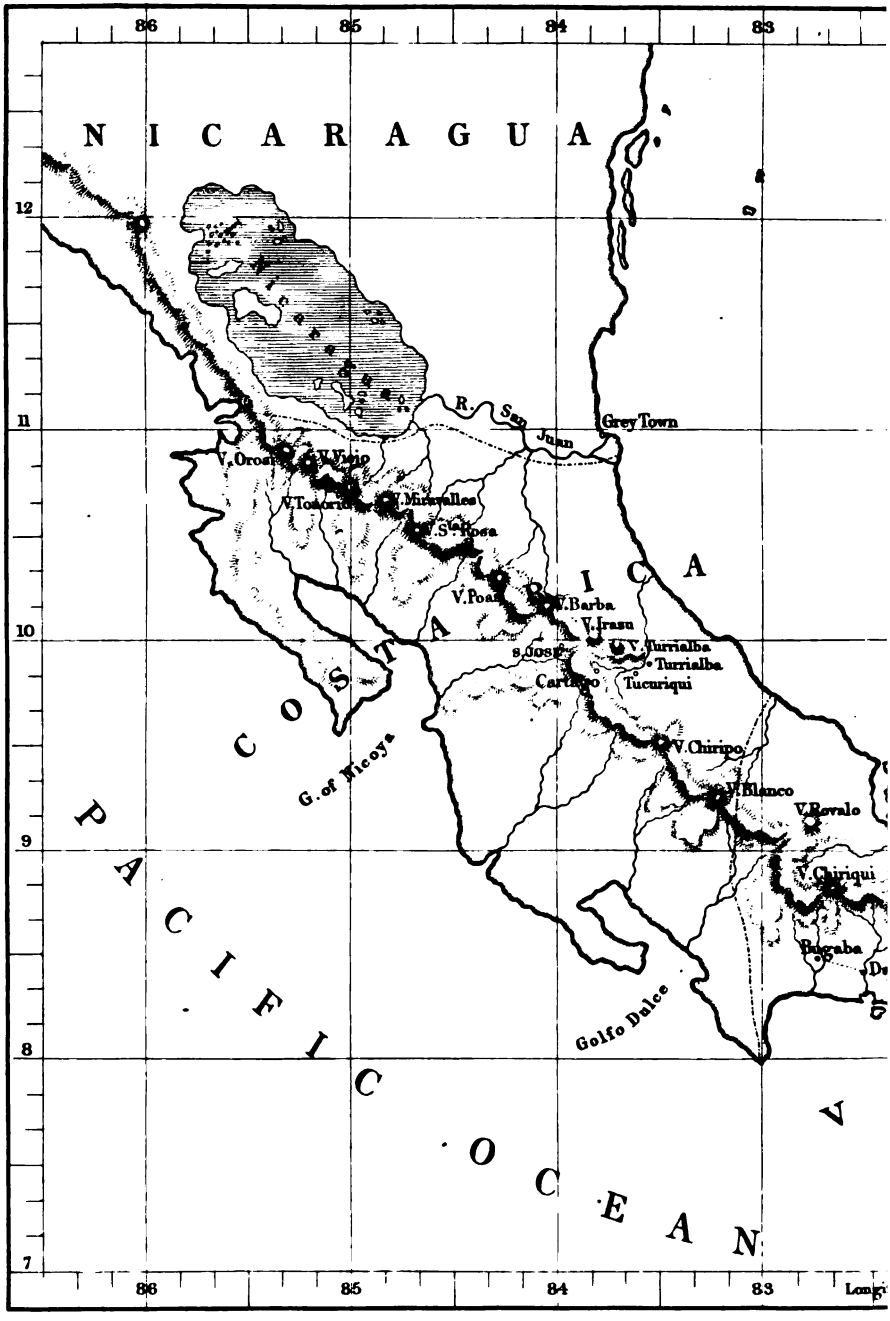
Fig. 2.

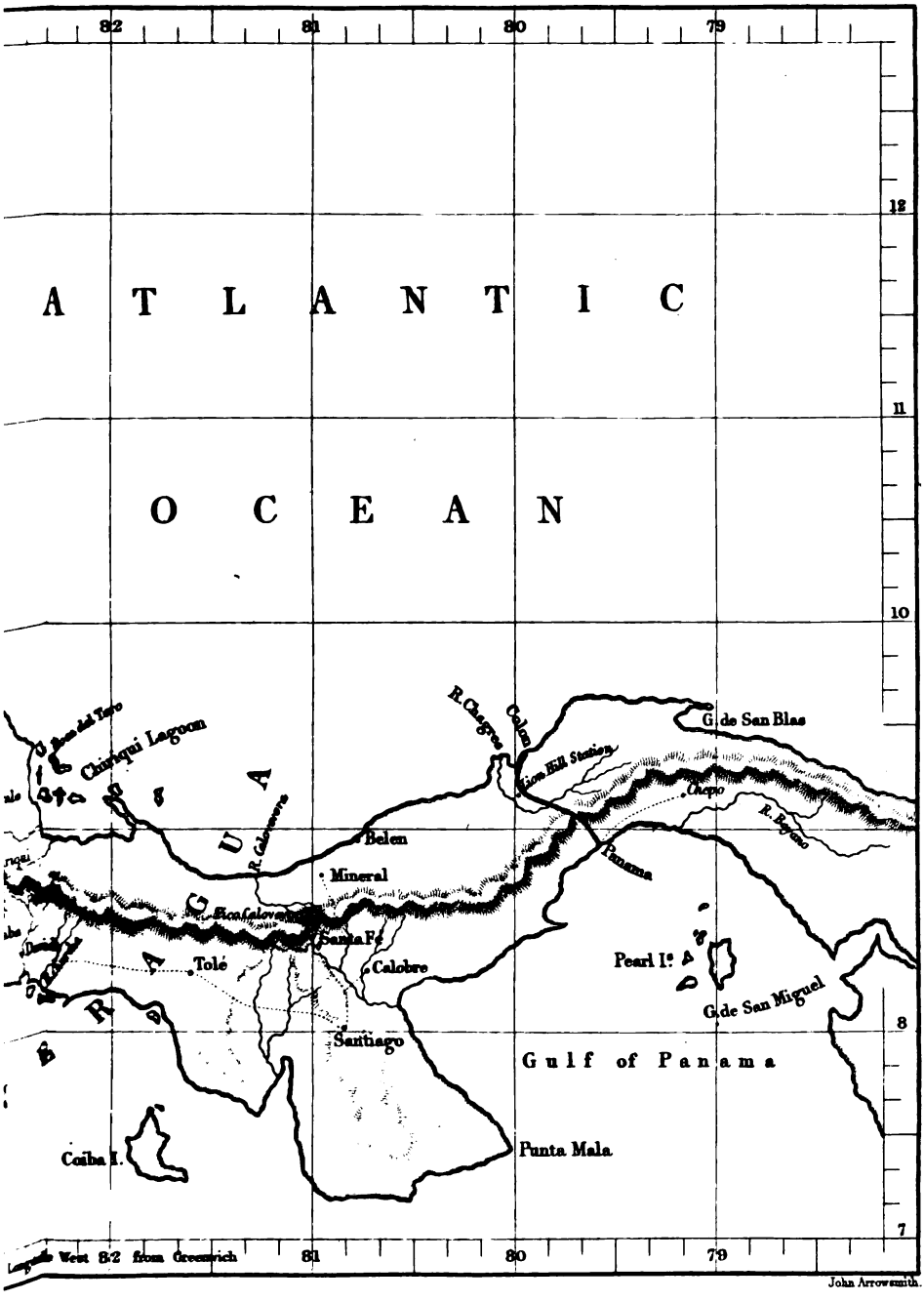
Nucleus.



Shell of *Aplysia melanopus*, showing nucleus to be nearly central.

description, as also of a place in the British Museum. Measured in a straight line, its length is 4½ inches; it is very plump, especially posteriorly, where, in girth, it measures 6 inches. That part which forms the head projects; and in front of it is the mouth (*a*), which


86
85
84
83
N I C A R A G U A
12
11
10
9
8
7
R. San Juan
Grey Town
V. Orosi
V. Viejo
V. Miravalles
V. Tenorio
S.ta Rosa
V. Poas
V. Barba
V. Irasu
V. Turrialba
Turrialba
San José
Cartago
Tucuriqui
C O S T A R I C A
G. of Nicoya
V. Chiripo
V. Blanco
V. Rovalo
V. Chiriqui
Bugaba
Golfo Dulce
P A C I F I C O C E A N
86
85
84
83


82
81
80
79
12
11
10
8
7
A T L A N T I C
O C E A N
Chiriqui Lagoon
R. Chagres
Colon
G. de San Blas
Gorge Hill Station
Chepo
R. Bayano
Belen
Mineral
R. Calovevora
Panama
Rio Calovevora
Santa Fé
Tolé
Calobre
Pearl Is.
G. de San Miguel
Santiago
Gulf of Panama
Punta Mala
Coiba I.
Longitude West 82 from Greenwich
John Arrowsmith.

opens perpendicularly, with prominent lips or jaws, that on the left side being of a fine blue colour, and the other red. At a short distance behind this, on each side, is a folded and slightly thickened membrane (*b*); and still further back, above, there is a more slender process on each side (the tentacles) (*c*); while rather below the first named, on the right side only, is a smaller red process, encompassed at its root with a bluish circle (reproductive orifice?) (*d*). The eye is small, scarcely to be discerned, and is situated near the root of the more posterior process of the two already named. The body, on which these processes are placed is of a decided yellow colour, and ends in an oval mantle of rather small dimensions, with a border that constitutes the gills; while the more extended lateral portion, which is of a lively yellow colour, is separated from the dorsal by a line or groove, which seems to form the line of distinction between it and the sexual organs. A border or separated fold of this lateral division, of a bright red colour, proceeds forward from the hindmost border of the mantle, where there appears to be an opening into the body, to end on the side, at about half its length. The foot (*e*) is of dark brown colour, a little the widest in front, and slightly projecting behind, where the lateral portion of the body also slopes down, a small portion of the latter having above it a curved line of separation. The whole of the body, with the exception of the mantle and foot, is marked with tints of red on the brilliant yellow surface.

Of the other example above referred to, the colours had all been resolved into a dull brown, and the foot was much puckered. I could not discover in the lips or jaws any roughness or firmness as of teeth; and the single lateral process at the side of the neck was absent. The internal plate (fig. 2) is in figure half an oval, 2 inches wide, thin, subcartilaginous, and marked with faint lines diverging from the straight border. Almost, but not exactly, at the middle of its upper portion was a slight prominence or projection, but so injured as not to be accurately defined. Its surface was very slightly tinged with brown.

6. On some Collections of Birds from Veragua. By Osbert Salvin, M.A., F.L.S., F.Z.S., &c.—Part II.

(Plate XVII.)

Since my former communication * to the Zoological Society upon this subject, the same collector, Enrique Arcé, who furnished the materials for my paper, has been working industriously at the Ornithology of Veragua, and has accumulated so much material in my hands that I now deem it expedient to draw up a report on the additions made to my former list. Besides mentioning the species added to the catalogue of the birds of Veragua, I have again inserted

* P. Z. S. 1867, pp. 129-161.

into the present list the species concerning which fresh information, whether of distribution or classification, has been acquired. Although the greater number of species recorded in my former paper are here re-introduced, a considerable addition to our knowledge of their local distribution is made, and our information of the whole subject brought down to the most recent date in a complete form. Since 1867 Arcé has had the field to himself, no other naturalist having worked in his immediate district; though in the adjoining country of Costa Rica the Messrs. Carmiol and others have continued their assiduous labours. I have, then, nothing to add to the history of the literature of the birds of Veragua. The birds (of Arcé's collecting) described in these Proceedings since 1867 by Mr. Sclater and myself will all be inserted in their places; so it is unnecessary to enumerate them here.

That no small success has attended Arcé's labours will be manifest on referring to the total number of species of birds now given as inhabitants of Veragua. Nor are the novelties few or insignificant. The result shows that even the most limited areas of this rich country, when diligently examined, seldom fail to reveal some striking novelty, the existence of which in some cases could have in no way been anticipated, every gap in the distribution of allied forms being apparently filled in. The whole number of new species described since 1867, together with those now given, amounts to nineteen. Their names are as follows:—*Thryothorus semibadius, Buthraupis arcæi, Pyranga testacea, Tachyphonus nitidissimus, T. chrysomelas, Chlorospingus punctulatus, C. hypophæus, Grallaria princeps, Leptotriccus superciliaris, Empidonax atriceps, Chiromachæris aurantiaca, Antrostomus saturatus, Chætura fumosa, Lophornis adorabilis, Selasphorus torridus, S. ardens, Eupherusa egregia, Chloronerpes simplex, Melanerpes chrysauchen.*

Besides these nineteen species, five others are now added to the Central-American fauna, viz. *Leistes guianensis, Pseudocolaptes boissoneauti, Thamnophilus immaculatus, Stenopsis cayennensis,* and *Urubitornis solitaria.*

The genera now first introduced into the Central-American fauna are *Buthraupis, Leptotriccus, Leistes, Pseudocolaptes, Stenopsis,* and *Urubitornis.*

My first paper on the birds of Veragua records the occurrence of 216 species of birds in that country*. This number Arcé has now exactly doubled, by having transmitted no less than 216 additional species, thus raising the whole number to 432. It is more than probable that this number will be considerably increased; for in Costa Rica 520 species are recorded as inhabitants of that country, whilst on the Panama Railway-line the number is about 400.

Of these 432 species, 113 are not included in the Costa-Rican list, and at least 70 more are found at Panama which have not as yet been recorded from either Veragua or Costa Rica. From these figures we

* The actual number is 220, from which 4 (viz. nos. 37, 93, 159, and 206) must be deducted, the species being now otherwise determined.

get 703 species as an approximate estimate of the number of species included in the whole bird-fauna of Central America south of the Lake of Nicaragua. Considering how imperfectly several orders must be represented, we shall certainly not be estimating the whole number too highly if we place it at 720 species.

The superficial area of Central America south of the Lake of Nicaragua is about 38,000 square miles, or an area about equal to two-thirds that of England and Wales; yet in this limited extent of country we find a considerably greater number of birds than in the whole of Europe; in fact, the number nearly equals that of the whole continent of America, north of Mexico.

The names of the places visited by Arcé in his collecting-expeditions are Calovevora, Calobre, Chitra, Boqueti de Chitra, Castillo, Laguna del Castillo, and Cordillera del Chucu. Many of these places are unmarked on the best map I can find, viz. that of Codazzi, published in Bogotá in 1864; but from Arcé's letters I gather they are all situated in one district, near Calobre and Santiago de Veraguas, and are in what is called El Mineral de Veraguas. I also infer that Arcé's collecting-ground has been almost, if not entirely, on the southern, or that slope of the main Cordillera which stretches towards the Pacific Ocean.

The later collections, which bear the localities Mina de Chorcha, Bugaba, and Volcan de Chiriqui, were all made since Arcé reached David, the principal village of the district of Chiriqui. These collections, too, were formed on the southern slope of the Volcano, the highest point reached being about 6500 feet above the sea-level.

I hope yet to be able to fill in, on the accompanying map (Plate XVII.), all the names of the places above mentioned. In the meantime, those already supplied will give the general position of the districts explored.

The publication by Mr. Lawrence of 'A Catalogue of the Birds found in Costa Rica' (Ann. Lyc. N. Y. ix. pp. 86–149) supplies an important addition to our knowledge of the isthmian avifauna, and enables me to review in a more complete manner the generalizations I ventured to make respecting the relationship the birds of Veragua bear to those of the surrounding countries.

In my former paper I stated that the portion of Veragua then explored showed that, as regards its birds, a rather stronger numerical affinity was exhibited towards Panama than towards Costa Rica, and a slightly closer connexion with the more northerly portions of Central America than with the adjacent southern continent. But, owing to the incompleteness of our knowledge at the time of the bird-fauna of Costa Rica, I somewhat mistrusted the result shown by the facts at my disposal. Partly owing to the exploration of the district of Chiriqui, and partly to the large amount of distributional knowledge acquired by the publication of Mr. Lawrence's list, the relationship between bird-life in Veragua and in the adjoining countries now assumes to a great extent a different aspect. The bonds of union with Costa Rica are drawn much more close;

and, further, it now appears that the connexion with the Isthmus of Panama is hardly greater than with the more northern portions of Central America. These results may be exhibited as follows in a tabular form:—

Total number of species found in Veragua, 432.

Number of Veraguan species also found in

South America	179, or 41	per cent of the whole.
Panama	238, or 55	,, ,,
Costa Rica	317, or 74	,, ,,
Guatemala and Mexico	210, or 49	,, ,,
North America	60, or 14	,, ,,

I find that the number of birds which are not found outside the limits of Panama, Veragua, and Costa Rica, or that part of Central America included between the Isthmus of Darien and the Lake of Nicaragua, is altogether about 175 species; or, if we take the whole bird-fauna of this district, at say 720, 25 per cent. are peculiar.

These 175 species are distributed as follows:—

Number peculiar to

Panama	15, or $3\frac{3}{4}$	per cent. of the ascertained fauna.
Veragua	29, or 7	,, ,,
Costa Rica	35, or 7	,, ,,
	79	

Veragua and Costa Rica have in common	49	species
Veragua and Panama ,,	14	,,
Veragua, Panama, and Costa Rica ,,	26	,,
Costa Rica and Panama ,,	7	,,
	96	
Add peculiar species	79	
	175	

Thus, viewing this section of the Isthmus as a whole, we find that, without making any deductions whatever, no less than 25 per cent. of its bird-population is unrepresented specifically in any other portion of the adjoining regions. When, however, we take a portion of this country and compare it with the rest of the whole district, we find that the greatest amount of peculiarity does not exceed 7 per cent.; and the least amount reaches as low as $3\frac{3}{4}$ per cent.

The characteristic elements of the Central-American fauna consist not so much in the amount of generic peculiarity, which is very small, but in the fact that a very considerable portion of South-American forms are here represented, not as specifically identical, but, in a large number of instances, as definably distinct in degrees of varying value. The element of the Central-American bird-fauna to be traced to the northern continent, on the other hand, maintains a very different relationship to the bird-fauna of that continent. With the exception of a few species isolated in the mountains of the higher

portions of the Isthmus, and some others, we find that northern forms found in Central America are specifically identical with northern species, and that their presence is due in a great measure to migration during the winter season. As regards numbers, we find a gradual diminution as we proceed away from North America. These migrants, however, are everywhere present, some few passing still further south into the equatorial provinces of the southern continent.

Costa Rica and Veragua, with Panama, possess these characteristics of the Central-American fauna in the highest degree. It is here we find the greatest number of South-American genera represented; but the species are to a considerable extent not the same as the continental species.

We find, too, a considerable number of northern migrants, most of which are specifically identical with northern birds.

In endeavouring to account for the facts as we find them, by changes in past times in the physical features of the Isthmus, we seem to require:—1st. A union between Costa Rica, Veragua, and Panama with the southern continent, when those united lands possessed in common a much larger number of species specifically the same than at present. During this time the oceans may have been united north of Costa Rica. 2nd. The long duration of Costa Rica and Veragua as a "continental" island, during which time the union of the two oceans has been of greater extent. This period must be long enough to have established specific differences much as we now find them. 3rd. The emergence of the whole Isthmus in its present form.

These requirements seem to fall in fairly with what has been demanded in other branches of natural science. Dr. Duncan* requires a union in Miocene times between the oceans to account for the specific identity of certain corals; Dr. Günther†, too, requires a union between the oceans to account for the specific identity of 30 per cent. of the fish now found on both sides of the Isthmus.

The union here demanded will suit my first and second requirements, I only regulate the amount; and as for the period when it took place, the fixing it to Miocene times would seem to answer to the requirements of the birds.

That *all* the peculiar features of so varied a fauna can be accounted for by this theory I do not pretend to say. The changes in the physical features of the Isthmus indicated by the numerous minor modifications of existing species, belong to the most recent events in geological history. To account for the greater differences observable we must go deeper into the abyss of geological time, where light at present is barely perceptible.

Catharus griseiceps.

Chitra; Calovevora; Calobre.

1. CATHARUS MEXICANUS, Bp.; Scl. Cat. Am. B. p. 1.

Calovevora; Cordillera del Chucu.

* Quart. Journ. Geol. Soc. xix. 1863, p. 455.

† Trans. Zool. Soc. vi. p. 397.

Contrary to my expectations (P. Z. S. 1867, p. 132), it appears that this species is found in Veragua, as well as the next following, which is also met with in Costa Rica (Lawr. Ann. Lyc. N. Y. ix. p. 90). Arcé has sent us two specimens.

Catharus fuscater.
Calovevora; Cordillera del Chucu.

2. TURDUS ALICIÆ, Baird, Rev. Am. B. p. 21.
V. de Chiriqui.
A single specimen from the southern slope of the Volcano of Chiriqui agrees accurately with a specimen thus named by Prof. Baird in our collection, received from the Smithsonian Institution. This Thrush has not as yet been noticed in Mexico or Guatemala; but in Costa Rica its occurrence is recorded (Lawr. Ann. Lyc. N. Y. ix. p. 91).

Turdus grayi.
Chitra; V. de Chiriqui.

Turdus tristis (Sw.); Scl. & Salv. Ex. Orn. p. 145. *T. leucauchen*, Scl.; Salv. P. Z. S. 1867, p. 132.
Calovevora; Calobre; Boquete de Chitra; V. de Chiriqui.
A typical specimen from Bullock's Mexican collection, marked "*Turdus tristis*" in Swainson's MS., now in the Museum of the University of Cambridge, fully confirms the view taken (Ex. Orn.) as to the bird called *T. assimilis*, Cab., being identical with *T. tristis* of Swainson.

Turdus obsoletus.
The acquisition of additional specimens from Costa Rica tend to confirm Mr. Lawrence's view that the sexes of this species are similar in plumage, and that the bird is allied to *T. grayi* rather than to the section containing such species as have the male black and the female brown.

3. TURDUS NIGRESCENS, Cab. J. f. Orn. 1860, p. 324.
V. de Chiriqui.
Evidently a highland species. It has hitherto only been noticed in the woods of the Volcano of Yrazu, in Costa Rica, and similar localities. Arcé has forwarded a pair. The sexes, as marked by him, are quite similar in coloration.

Rhodinocichla rosea.
Calovevora; Chitra; Mina de Chorcha.

4. MYIADESTES MELANOPS, Salv. P. Z. S. 1864, p. 580, t. 36.
Calovevora; Cordillera del Chucu.

5. THRYOTHORUS FASCIATOVENTRIS, Lafr.; Scl. & Salv. P. Z. S. 1864, p. 346.
Bugaba.
This fine species is also found in Costa Rica (Lawr. Ann. Lyc. N. Y.

ix. p. 92). Arcé obtained several specimens, in some of which the cross markings on the under parts are almost obsolete.

6. THRYOTHORUS SEMIBADIUS, sp. n.

Supra intense castaneus, fronte et capitis lateribus albis, plumis singulis nigro marginatis: alis et cauda nigris extus badio transfasciatis, tectricibus alarum minoribus albo transvittatis: subtus albus, a pectore usque ad caudam nigro transfasciatus, gula pure alba, hypochondriis postice castaneo lavatis: rostro corneo mandibula pallidiore; pedibus nigricantibus: long. tota 5·3 *poll. angl., alæ* 2·6, *caudæ* 2·0, *rostri a rictu* 0·9, *tarsi* 0·9.

Fem. *Omnino mari similis.*

Hab. Bugaba (*Arcé*).

Obs. Species distincta, *T. nigricapillo* Scl. forsan affinis, sed pileo nigro carens.

This species belongs to the section *Thryophilus*, Baird, having an open and not operculated nostril. It has no very near allies, but somewhat resembles *T. nigricapillus* and *T. castaneus*, Lawr., both of which, however, are black-headed species, and have the under parts less densely and regularly marked. Arcé has forwarded us both sexes of this Wren from the district of Chiriqui.

7. THRYOTHORUS MODESTUS, Cab. J. f. Orn. 1860, p. 409.

Bugaba.

Specimens from this locality resemble the Panama race (Baird, Rev. Am. B. p. 131).

Thryothorus rufalbus.

Calovevora; Chitra; Castillo.

Thryothorus rutilus.

Boqueti; Calovevora; Bugaba.

This species, though common in Veragua, has not yet been met with in Costa Rica.

Henicorhina leucosticta.

Boqueti de Chitra; Cordillera del Chucu.

8. HENICORHINA LEUCOPHRYS (Tsch.). *Heterorhina leucophrys*, Baird, Rev. Am. B. p. 118.

Calovevora; Chitra; Cordillera del Chucu; Mina de Chorcha.

Prof. Baird (*l. c.*) recognizes two races of this form; but after a close examination of our series of specimens, which includes examples from Bogota, I confess I do not think he has established his case. In all the differential characters brought forward I find variation in different individuals, so that the nine specimens before me, if separated, cannot be grouped in a definite manner. It is true, I may not have the species called by Baird *H. leucophrys*; but a single Costa-Rica skin, and several from Veragua, seem to agree very well with his description. Our Guatemalan specimens are darker on the head than others from Bogota; the Veraguan examples are variable in this respect, as also in the amount of dark striations on the throat.

Baird, with some doubt, refers Mexican and Guatemalan specimens to *Merulaxis griseicollis*, Lafr. (R. Z. 1840, p. 103), a species Sclater considers, with Lafresnaye himself, to be a *Scytalopus* (Cat. Am. B. p. 168), and to belong to the *Pteroptochidæ*. Though not altogether satisfactory, I must say I think Lafresnaye's description suits the *Scytalopus* better than the *Henicorhina*, no mention whatever being made of the conspicuous markings on the sides of the head in the present bird. Taking Baird's list of localities, the evidence afforded by the distribution of this Wren is all in favour of there being but one species.

9. CISTOTHORUS ELEGANS, Scl. & Salv.?; Baird, Rev. Am. B. p. 146.

Bugaba.

A single specimen in abraded plumage seems to belong to this species. The bill, however, is very robust, and the head exhibits none of the longitudinal light markings to be seen in *C. elegans*. As regards the colouring of the lower back and uropygium, the chief distinguishing character between *C. elegans* and *C. palustris*, this skin agrees very fairly with the former. The specimen is not in a condition good enough to enable me to determine it satisfactorily.

10. POLIOPTILA SUPERCILIARIS, Lawr.; Baird, Rev. Am. B. p. 71.

Bugaba.

Mniotilta varia.

Calovevora; Cordillera del Chucu; V. de Chiriqui.

11. PARULA INORNATA, Baird, Rev. Am. B. p. 171.

Boqueti de Chitra; V. de Chiriqui.

12. PARULA GUTTURALIS (Cab.), J. f. Orn. 1860, p. 329; Baird, Rev. Am. Birds, p. 172.

V. de Chiriqui.

Arcé's last collection contains three specimens of this beautiful species, which are the first I have ever seen. According to Arcé's dissections, both sexes have the interscapular region black; but in the female this character is neither so extensive nor so regular in form as in the male.

Helminthophaga chrysoptera.

Calovevora.

Helminthophaga peregrina.

Calovevora; V. de Chiriqui.

Dendrœca pennsylvanica.

Chitra; Calovevora; V. de Chiriqui.

13. DENDRŒCA VIRENS (Gm.); Baird, Rev. Am. B. p. 182.

V. de Chiriqui.

14. DENDRŒCA CÆRULEA (Wils.); Baird, Rev. Am. B. p. 191.
Calovevora.

Dendrœca blackburniæ.
Calovevora; Chitra; Calobre; Cordillera del Chucu; V. de Chiriqui.

Dendrœca æstiva.
Calovevora; Chitra; Calobre; Cordillera del Chucu; Bugaba.

15. MYIODIOCTES PUSILLUS (Wils.); Baird, Rev. Am. B. p. 240.
V. de Chiriqui.

16. HENICOCICHLA NOVEBORACENSIS (Gm.); Baird, Rev. Am. B. p. 215.
Calovevora.

17. HENICOCICHLA LUDOVICIANA (Aud.); Baird, Rev. Am. B. p. 217.
Bugaba.

18. HENICOCICHLA AUROCAPILLA (L.); Baird, Rev. Am. B. p. 214.
V. de Chiriqui.

Basileuterus mesochrysus.
Chitra; Calobre.

19. BASILEUTERUS CULICIVORUS (Licht.); Baird, Rev. Am. B. p. 245.
Calovevora.

20. BASILEUTERUS BIVITTATUS (Lafr. & D'Orb.), Salv. Ibis, 1870, p. 108. *B. melanotis*, Lawr. Ann. Lyc. N. Y. ix. p. 95.
Cordillera del Chucu.

21. BASILEUTERUS MELANOGENYS, Baird, Rev. Am. B. p. 248.
V. de Chiriqui.
A very well marked and distinct species, hitherto only known from the highlands of Costa Rica.

Basileuterus uropygialis.
Bugaba.

Setophaga ruticilla.
Calovevora; Chitra.

22. SETOPHAGA AURANTIACA, Baird, Rev. Am. B. p. 261; Salv. Ibis, 1869, p. 313.
Calovevora; V. de Chiriqui.
This species is exceedingly closely allied to *S. verticalis* (D'Orb. & Lafr.), the under surface of which, however, is lemon- rather than

orange-coloured. This difference is well shown by a very bright-coloured specimen from Chiriqui, which has also the forehead and sides of the crest deep black, instead of plumbeous, the other distinctive character pointed out by Prof. Baird.

23. HIRUNDO HORREORUM, Barton; Baird, Rev. Am. B. p. 294.

Calobre; V. de Chiriqui.

24. ATTICORA CYANOLEUCA, Vieill. *A. cyanoleuca*, var. *montana*, Baird, Rev. Am. B. p. 310.

Calovevora.

25. STELGIDOPTERYX FULVIPENNIS (Scl.); Baird, Rev. Am. B. p. 316; Salv. Ibis, 1870, p. 108.

Calovevora.

Two examples, agreeing with Costa-Rican and Guatemalan specimens.

26. STELGIDOPTERYX UROPYGIALIS (Lawr.). *S. fulvigula*, Baird, Rev. Am. B. p. 317.

Chitra.

Agrees with Panama specimens.

Vireosylvia flavoviridis.

Chitra; Mina de Chorcha; Bugaba.

27. VIREOSYLVIA PHILADELPHICA, Cass.; Baird, Rev. Am. B. p. 340.

Chitra.

28. VIREOSYLVIA FLAVIFRONS (Vieill.); Baird, Rev. Am. B. p. 346.

Calovevora; V. de Chiriqui.

29. HYLOPHILUS OCHRACEICEPS, Scl.; Baird, Rev. Am. B. p. 376.

Bugaba.

Hylophilus viridiflavus.

Bugaba.

Hylophilus decurtatus.

Castillo; Chitra; Calovevora.

30. VIREOLANIUS PULCHELLUS, Scl. & Salv. Ex. Orn. p. 13, t. 8.

Calovevora.

31. CYCLORHIS SUBFLAVESCENS, Cab. J. f. Orn. 1860, p. 405; Baird, Rev. Am. B. p. 388.

V. de Chiriqui.

32. PTILOGONYS CAUDATUS, Cab. J. f. Orn. 1860, p. 402; Scl. & Salv. Ex. Orn. p. 11, t. 6.

V. de Chiriqui.

Arcé has sent two fine male specimens of this bird from the southern slope of the volcano of Chiriqui, a new and more southern locality for this beautiful species.

33. DIGLOSSA PLUMBEA, Cab. J. f. Orn. 1860, p. 411.

V. de Chiriqui.

As in the case of the last-mentioned species, the occurrence of *Diglossa plumbea* in the Chiriqui volcano indicates a more southern range for this hitherto purely Costa-Rican bird.

The female of *D. plumbea*, as might have been anticipated, is not distinguishable from that of *D. baritula*, Wagl. It is olivaceous brown above, with dark ochraceous edgings to the wing-coverts and secondaries; beneath it is light brown, with an olive tinge over the breast and sides.

34. DACNIS VENUSTA, Lawr.

Bugaba.

35. DACNIS CAYANA (Linn.); Scl. Cat. Am. B. p. 50.

Mina de Chorcha.

I can detect no differences whatever between an adult male from this locality and a specimen from Pebas, Upper Amazons, which has been called *D. cayana* (Scl. & Salv. P. Z. S. 1867, p. 977). Two immature males from Chepo are somewhat intermediate between *D. cayana* and *D. ultramarina*, Lawr., inclining rather to the former. I should have expected that *D. ultramarina* would have alone represented this form in Central America, but such does not appear to be the case.

Chlorophanes guatemalensis.
Calovevora; Boqueti de Chitra; Bugaba.

Cœreba carneipes.
Calovevora; Castillo; Chitra; Cordillera del Chucu; Bugaba.

Cœreba lucida.
Bugaba.

Certhiola luteola.
Cordillera del Chucu; Bugaba.

36. CHLOROPHONIA CALOPHRYS (Cab.); Scl. & Salv. Ex. Orn. p. 135, t. 68.

Calovevora; Cordillera del Chucu; V. de Chiriqui.
A highland species, hitherto only observed in Costa Rica.

37. EUPHONIA ELEGANTISSIMA, Bp.; Scl. Cat. Am. B. p. 56.

Calovevora.

38. EUPHONIA MINUTA, Cab.?; Scl. Cat. Am. B. p. 57. *E. minuta*, Scl. & Salv. Ibis, 1860, p. 275.

Calovevora; Bugaba.

Two adult male specimens sent by Arcé agree accurately with the single example I obtained at Coban in 1859. The yellow forehead is rather darker in colour and greater in extent than in a Bogotan specimen of *E. minuta*. In the white crissum, in the markings of the tail-feathers, and in the tint of the upper surface, I can trace no difference, and therefore think it best not to describe the bird under a new name, believing that did I do so I should only be adding to the confusion introduced into the group by Cabanis, whose descriptions of the Costa-Rican species, being in several instances based upon immature birds, are very unsatisfactory and perplexing.

39. EUPHONIA GRACILIS (Cab.); J. f. Orn. 1860, p. 333.

Bugaba; V. de Chiriqui.

The original specimens upon which Cabanis founded this species were all immature. We now have what I believe to be the adult, of which I give the following description:—

Supra cum gutture toto cærulescenti-nigra: alis extus viridi-æneo tinctis: fronte, pilei dimidio antico et corpore subtus luteis: cauda nigra immaculata: long. tota 3·8, *alæ* 2·3, *caudæ* 1·3, *tarsi* 0·65.

Obs. E. concinnæ affinis, sed fronte lutea nec nigra et colore supra cærulescentiore facile distinguenda.

40. EUPHONIA LUTEICAPILLA (Cab.); J. f. Orn. 1860, p. 332.

Boquete de Chitra; Bugaba.

A very pretty and distinct species, of which we have received several specimens, both from Veragua and also from Panama (Paraiso Station). The female may be described as follows:—

Supra olivacea: alis caudaque nigris, extus olivaceo limbatis: subtus flava, medialiter clarior, hypochondriis olivaceo indutis.

Euphonia crassirostris.

Chitra; Boqueti de Chitra; Calovevora.

The undetermined specimen (No. 37 of my previous list) is an immature bird of this species.

Euphonia annæ.

Cordillera del Chucu; Calovevora.

41. EUPHONIA GOULDI, Scl. Cat. Am. B. p. 60.

Bugaba; V. de Chiriqui.

Calliste icterocephala.

Calovevora; Boqueti de Chitra; Cordillera del Chucu; V. de Chiriqui.

Calliste gyroloides.

Calovevora; Boqueti de Chitra; Cordillera del Chucu; Bugaba; V. de Chiriqui.

Calliste franciscæ.
Calovevora; Chitra; Laguna del Castillo; Mina de Chorcha; Bugaba.

42. CALLISTE DOWII, Salv. P. Z. S. 1863, p. 168; Scl. Ibis, 1863, p. 451, t. 12.
Cordillera del Chucu.
The sexes of this species, as marked by Arcé, hardly differ. The male is somewhat brighter in plumage than the female.

43. CALLISTE GUTTATA, Bp.; Sclater, Mon. Calliste, t. 10.
V. de Chiriqui.

44. BUTHRAUPIS ARCÆI, Scl. & Salv. P. Z. S. 1869, p. 439, t. 31.
Cordillera del Chucu.

Tanagra diaconus.
Calovevora; Chitra.

Ramphocœlus dimidiatus.
Calovevora; Chitra; Castillo; Cordillera del Chucu; Mina de Chorcha.
The last-mentioned locality, in the neighbourhood of Chiriqui, seems to be the most northern limit of the range of this species, as in Costa Rica it has not yet been observed.

Ramphocœlus passerinii.
Mina de Chorcha; Bugaba.
This species, on the other hand, seems to attain its most southern limit in the neighbourhood of Chiriqui.

45. PYRANGA RUBRA (L.).
Calovevora.

Pyranga æstiva.
Calovevora; Chitra; Boqueti de Chitra; Cordillera del Chucu.

Pyranga testacea, Scl. & Salv. P. Z. S. 1868, p. 388. *P. hepatica*, Salv. P. Z. S. 1867, p. 139.
Calovevora; Chitra; Boqueti de Chitra.
This species has also been found in the vicinity of Belize, British Honduras (Ridgway, Pr. Ac. Phil. 1869, p. 133).

46. PYRANGA ERYTHROMELÆNA (Licht.).
Calovevora; V. de Chiriqui.

47. PYRANGA BIDENTATA, Sw.
V. de Chiriqui.

Phœnicothraupis vinacea, Lawr. Proc. Ac. Phil. 1867, p. 94; Ann. Lyc. N. Y. ix. p. 99. *P. rubica*?, Salv. P. Z. S. 1867, p. 139.
Calovevora; V. de Chiriqui.

Lanio leucothorax.
Calovevora; Chitra; Cordillera del Chucu; Bugaba; V. de Chiriqui.

Eucometis spodocephala.
Bugaba; Mina de Chorcha.

With two adult specimens of this species, Arcé has sent a bird that I for some time considered to be an undescribed member of this genus, as the head and throat are of precisely the same tinge of olivaceus as the back, instead of being plumbeous as in adult birds of *E. spodocephala*. As I can detect no other differences whatever, except smaller dimensions, and the bird shows some signs of immaturity, I now think that it may be a young individual of the above species. The sex is not marked; but it cannot be the normal adult female of *E. spodocephala*, as we have dissected specimens both of that species and *E. cristata*, which have shown that the sexes do not differ in coloration in this group.

48. TACHYPHONUS NITIDISSIMUS, sp. n.

Nitenti-niger, crista aurantiaca, tectricibus alarum minoribus et subalaribus albis: rostro nigro, mandibulæ basi albicante, pedibus fuscis.

Fem. *Olivacea, subtus flavescentior: alis et cauda fuscis, extus olivaceo limbatis: long. tota* 5·5, *alæ* 2·8, *caudæ* 2·4, *tarsi* 0·75.

Hab. Bugaba (*Arcé*).

Obs. Affinis *T. delattrii* et *T. luctuoso*, sed ab hoc colore nitentiore et subalaribus albis, ab illo crista aurantiaca differt.

A very distinct species, curiously combining the characters of the two species above mentioned. In size it is also intermediate, being smaller than *T. delattrii* and larger than *T. luctuosus*. Arcé has sent several specimens, all from the district of Chiriqui.

49. TACHYPHONUS CHRYSOMELAS, Scl. & Salv. P. Z. S. 1869, p. 440, t. 32.
Cordillera del Chucu.

50. CHLOROSPINGUS PUNCTULATUS, Scl. & Salv. P. Z. S. 1869, p. 440.
Cordillera del Chucu.

51. CHLOROSPINGUS HYPOPHÆUS, Scl. & Salv. P. Z. S. 1868, p. 389.
Calovevora; Chitra; Boqueti de Chitra.

52. CHLOROSPINGUS ALBITEMPORALIS, Lafr.; Scl. & Salv. P. Z. S. 1868, p. 630.
V. de Chiriqui.

Arremon aurantiirostris.
Cordillera del Chucu; Mina de Chorcha; Bugaba.

Buarremon crassirostris.
Cordillera del Chucu.

53. BUARREMON CHRYSOPOGON (Bp.).
Castillo; V. de Chiriqui.

Buarremon brunneinuchus.
Calovevora; V. de Chiriqui.

54. PEZOPETES CAPITALIS, Cab. J. f. Orn. 1860, p. 415.
V. de Chiriqui.
This appears to be a rare species, as none of the collectors of the Smithsonian Institution have yet met with it. When in Costa Rica, Arcé was fortunate enough to obtain two specimens in the Volcan de Cartago; these are the only others I have seen. With the exception of the tarsi and toes being rather stronger, *Pezopetes* does not differ from *Buarremon*, in which genus it might be very properly included.

Saltator magnoïdes.
Calovevora; Chitra; Mina de Chorcha; Bugaba; V. de Chiriqui.

Saltator isthmicus.
Chitra.

55. HEDYMELES LUDOVICIANUS.
V. de Chiriqui.

56. PHEUCTICUS TIBIALIS, Lawr. Ann. Lyc. N. Y. viii. p. 478.
Calovevora; Chitra; Boqueti de Chitra; Calobre.

Guiraca concreta.
Calovevora; Boqueti de Chitra; Bugaba.

Oryzoborus funereus.
Calovevora.

57. SPERMOPHILA INTERMEDIA, Cab. Mus. Hein. i. p. 149. *S. schistacea*, Lawr. Ann. Lyc. N. Y. viii. p. 10.
Bugaba.
Agrees with specimens in Sclater's collection from Cayenne, Venezuela, and Bogotá.

Spermophila semicollaris.
Bugaba.
A specimen from this locality is without the white collar across the throat; others, from Calovevora, Chitra, and Mina de Chorcha, have this collar, but to a variable extent: I suppose these last should be called *S. collaris*, Lawr. One of the Chitra specimens has the rump quite white. Judging from seven specimens before me, and seeing that the amount of white forming the collar is variable, I find great difficulty in assigning my specimens to the species described by Mr. Lawrence as *Spermophila hicksi*, *S. semicollaris*, *S. collaris*, and *S. fortipes*, all of which are found on the Panama Railway-line or at Chiriqui. Concise diagnostic characters of these four birds would be useful, and would afford a better opportunity of judging

whether the grounds for their separation are based upon sufficiently constant characters.

From Mr. Lawrence's descriptions I gather that *S. semicollaris* has a white patch on each side of the neck, but no collar interrupting the uniform black of the chin, throat, and breast. *S. collaris* has a narrow white collar. *S. hicksi* has the throat white and a collar uniting with it. *S. fortipes* has a white patch on each side of the neck connected with a narrow collar, and thus differs from *S. semicollaris*, but resembles *S. collaris*, with which it is not compared.

Have we here really more than one variable species?

Volatinia jacarina.
Chitra.

Phonipara pusilla.
Chitra.

Cyanospiza ciris.
V. de Chiriqui.

58. CYANOSPIZA CYANEA (Linn.); Scl. Cat. Am. B. p. 107.
Calovevora.

59. ZONOTRICHIA PILEATA (Bodd.).
Calovevora; Chitra; V. de Chiriqui.

Embernagra striaticeps.
Calovevora; Chitra; Bugaba.

Euspiza americana.
Chitra.

60. CHRYSOMITRIS MEXICANA (Sw.); Scl. Cat. Am. B. p. 124.

This species ranges as far south as Panama (Scl. & Salv. P. Z. S. 1864, p. 353). The presence of *C. columbiana*, Lafr. (Lawr. Ann. Lyc. N. Y. ix. p. 103) in Costa Rica is at present hypothetical.

Ocyalus wagleri.
Chitra; Calobre.

61. OSTINOPS CRISTATUS.
Bugaba.

This is the most northern locality yet recorded for this wide-ranging species. It is found at Panama but not in Costa Rica.

Cacicus microrhynchus.
Bugaba.

Cassiculus prevosti.
Calovevora; Calobre.

Icterus baltimorensis.
Calobre.

Icterus giraudi.
Chitra; Castillo.

62. LEISTES GUIANENSIS (Linn.); Scl. Cat. Am. B. p. 138.

This common South-American species has not hitherto been noticed in Central America. Arcé's specimens differ in no way from Guiana and Bogotá examples.

63. MOLOTHRUS ÆNEUS (Wagl.); Scl. Cat. Am. B. p. 135.

Chitra; Calobre.

A Central-American species occurring in Costa Rica, but not yet noticed at Panama.

64. QUISCALUS MACRURUS, Sw.?

Calovevora; Calobre.

Two males sent by Arcé are smaller than Guatemalan specimens attributed to this species, but do not otherwise differ. They agree in dimensions with a specimen from Panama in our collection.

Sturnella ludoviciana.

Castillo; Calovevora; V. de Chiriqui.

65. CASSIDIX ORYZIVORA (Gm.); Scl. Cat. Am. B. p. 142.

Calovevora; Chitra; Calobre.

This common species has not yet been sent from Costa Rica. In Guatemala it is abundant in the lowland forests of Vera Paz in the vicinity of the clearings.

66. CYANOCORAX AFFINIS, v. Pelz.; Scl. Cat. Am. B. p. 145.

Calobre; Bugaba.

The only member of the Corvidæ in Veragua and Panama. Its range does not extend to Costa Rica.

Sclerurus mexicanus.

Calovevora.

This species, now found to inhabit portions of the southern continent as well as Mexico, will almost certainly occur in Costa Rica, where, however, its presence has not yet been discovered.

67. SYNALLAXIS ERYTHROPS, Scl. P. Z. S. 1860, p. 66; Lawr. Ann. Lyc. N. Y. ix. p. 105.

V. de Chiriqui.

The four specimens forwarded by Arcé all agree with one another, and with Sclater's type specimens, with which I have compared them. We possess a specimen of *Synallaxis* from Costa Rica (*Carmiol*), which agrees accurately with Mr. Lawrence's description of his *S. rufigenis* (Ann. Lyc. N. Y. ix. p. 105). The bird is in immature plumage, and may possibly turn out to be a young state of *S. erythrops*, though I hardly think so. Still the immature plumages of *Synallaxis* are so perplexing that I throw out this suggestion to induce a further examination should additional specimens come to hand.

68. AUTOMOLUS PALLIDIGULARIS, Lawr.; Scl. & Salv. P. Z. S. 1864, p. 354.

Boqueti de Chitra; Bugaba.

69. PSEUDOCOLAPTES BOISSONEAUTI (Lafr.); Scl. Cat. Am. B. p. 156.

Cordillera del Chucu.

A single immature specimen from the above locality agrees fairly with Bogotá specimens of this species. It is not improbable, however, that, when we see adult examples, differences may be found.

70. ANABAZENOPS VARIEGATICEPS, Scl. Cat. Am. B. p. 159.

V. de Chiriqui.

A Mexican and Guatemalan species, found also in Costa Rica, and here at probably the southern limit of its range.

71. ANABAZENOPS SUBALARIS, Scl.; Salv. Ibis, 1870, p. 110. *A. lineatus*, Lawr. Ann. Lyc. N. Y. viii. p. 127, et ix. p. 106.

Calovevora.

72. XENOPS HETERURUS, Cab.; Scl. Cat. Am. B. p. 159; Salv. Ibis, 1869, p. 319.

V. de Chiriqui.

This species hardly differs from the Brazilian *X. rutilus*, Licht. It also occurs in Costa Rica (Salv. *l. c.*).

Xenops mexicanus.

Calovevora; Bugaba.

Margarornis brunnescens.

Chitra; Cordillera del Chucu.

Costa-Rican agree with Veraguan specimens of this bird and with the type in Sclater's collection.

73. SITTASOMUS OLIVACEUS (Max.). *S. sylvioïdes*, Lafr. et auct.; Lawr. Ann. Lyc. N. Y. ix. p. 106.

Calovevora; V. de Chiriqui.

We have already given (Scl. & Salv. P. Z. S. 1868, p. 630) our reasons for uniting the Central-American with the Amazonian and Brazilian species described by Prince Max under the above name.

74. GLYPHORHYNCHUS PECTORALIS, Scl. & Salv. P. Z. S. 1864, p. 354.

Bugaba; Mina de Chorcha; V. de Chiriqui.

75. DENDROMANES ANABATINUS, Scl. Cat. Am. B. p. 161.

Bugaba.

A Mexican and Guatemalan species, but not yet observed in Costa Rica. A single example sent by Arcé agrees fairly with Guatemalan skins; it is, however, rather darker in general tint, somewhat larger, and has the bill blacker.

76. DENDROMANES HOMOCHROUS, Scl. Cat. Am. B. p. 162.

V. de Chiriqui.

This species, in Guatemala at least, is frequently found associating with the last on the same tree, where they assemble, perhaps half a dozen together, to feed on ants.

77. DENDROMANES ATRIROSTRIS (Lafr. & D'Orb.); Scl. & Salv. P. Z. S. 1864, p. 355.

Chitra.

Also found in Costa Rica, but not further north.

Dendrocolaptes sancti-thomæ.

Bugaba.

78. DENDRORNIS NANA, Lawr.; Scl. & Salv. P. Z. S. 1864, p. 355.

Calovevora; Bugaba.

Agrees with Panama specimens referred to this species.

Dendrornis lacrymosa.

Bugaba; V. de Chiriqui.

Dendrornis erythropygia.

Calovevora; Boqueti de Chitra; Cordillera del Chucu; Bugaba, V. de Chiriqui.

79. PICOLAPTES COMPRESSUS, (Cab.) J. f. Orn. 1861, p. 243; Salv. Ibis, 1869, p. 314.

Mina de Chorcha; Bugaba.

This lowland forest species is distributed over the whole of Central America, from Mexico to this point; it is not, however, found at Panama. This species was formerly considered by writers on Central-American ornithology (except Cabanis) to be the *P. lineaticeps* of Lafresnaye (see Cabanis, *l. c.*).

80. PICOLAPTES AFFINIS (Lafr.); Scl. Cat. Am. B. p. 166.

V. de Chiriqui.

This species, unlike the last, frequents only the forests of the upland districts of Central America and the forest-belts of the higher volcanoes. It occurs at intervals from Mexico to Veragua, keeping, however, its specific characters with great constancy.

81. XIPHORHYNCHUS PUSILLUS, Scl. P. Z. S. 1860, p. 278.

Boqueti de Chitra.

Three specimens of this curious form sent by Arcé agree with the type of *X. pusillus* in Sclater's collection, and present none of those perplexing variations observable in *X. trochilirostris* and its allies. *Xiphorhynchus pusillus* may be readily recognized by its dark coloured bill, which is not red, as in some allied species, nor black as in *X. procurvus*, Temm. The plumage, too, is dark-coloured, and the elongated stripes are narrow. The species is not smaller than

some other members of the genus, as its name would imply, but even exceeds Bogotá specimens of *X. trochilirostris* in our collection. The sexes, as determined by Arcé, are quite alike.

82. OXYRHYNCHUS FRATER, Scl. & Salv. Ex. Orn. p. 131, t. 66.

Calovevora; Chitra.

For a full account of this bird see our plate, *l. c.*

Cymbilanius lineatus.

Calovevora; Calobre; Mina de Chorcha.

83. THAMNOPHILUS IMMACULATUS, Lafr.; Salv. Ibis, 1870, p. 114.

Calobre; Calovevora; V. de Chiriqui.

This species, of which Arcé has sent both sexes, is also found in Costa Rica as well as in New Granada. It has not yet been noticed at Panama.

84. THAMNOPHILUS PUNCTATUS, Cab. J. f. Orn. 1861, p. 241.

Mina de Chorcha, Bugaba, V. de Chiriqui.

Originally described from Costa Rica, whence we have a single skin collected by Carmiol. The bird appears to be commoner in the district of Chiriqui, where Arcé has obtained us a good supply of specimens.

85. THAMNOPHILUS RADIATUS, Vieill.

Chitra; Calovevora.

Specimens from these localities agree with others from Panama ascribed to this species (see Scl. & Salv. P. Z. S. 1864, p. 355.).

Thamnophilus affinis, Cab. *T. doliatus*, Scl. P. Z. S. 1856, p. 141.

Bugaba.

Specimens agreeing with this northern race having been sent from the district of Chiriqui, it follows that Bridges's specimens must also be ascribed to the same race.

Thamnophilus bridgesi.

Mina de Chorcha; Bugaba.

On reaching the Chiriqui district, the original *habitat* of this species, Arcé at once obtained specimens. The same species also occurs in Costa Rica (Lawr. Ann. Lyc. N. Y. ix. p. 107).

86. THAMNISTES ANABATINUS, Scl. & Salv. P. Z. S. 1860, p. 299.

Calovevora; Bugaba.

Arcé's determination of the sexes of this species confirms the view originally taken, that the individuals which possessed the ferruginous dorsal spot were males. Costa-Rican and Veraguan specimens agree with the types from Vera Paz.

Dysithamnus semicinereus.

Calovevora; Chitra; Calobre; V. de Chiriqui.

Myrmotherula menetriesi.
Calovevora; Chitra; Bugaba; V. de Chiriqui.

The undetermined species, no. 93 of my previous list, is, I think, a female of this species, which is the only member of the genus Arcé has yet sent us from Veragua. Mr. Lawrence enumerates four species of this genus as found in Costa Rica, two of which I have not yet seen; the two others are also found at Panama, and may therefore belong to Veragua, but have hitherto escaped notice. I may also mention that we possess a skin collected by Carmiol in Costa Rica, which does not differ from these Veraguan birds, to which we have applied the above name.

87. FORMICIVORA BOUCARDI, Scl. Cat. Am. B. p. 183.

Bugaba.

Ramphocænus rufiventris.
Calobre; Bugaba.

Ramphocænus semitorquatus.
Calovevora.

Cercomacra tyrannina.
Mina de Chorcha; Bugaba.

88. MYRMECIZA IMMACULATA, Scl. & Salv. P. Z. S. 1864, p. 357.

Bugaba.

Agrees with Panama specimens. The species is also found in Costa Rica (Lawr. Ann. Lyc. N. Y. ix. p. 109).

89. PITHYS BICOLOR, Lawr.; Scl. & Salv. P. Z. S. 1864, p. 257.

Bugaba.

This species is also found in Costa Rica (Lawr. *l. c.*). Arcé's specimens agree with others from Panama, whence the types were obtained.

90. GYMNOCICHLA NUDICEPS, Cass.; Scl. & Salv. P. Z. S. 1864, p. 356, et 1869, p. 417.

Mina de Chorcha; Bugaba.

Specimens, including examples of both sexes, from the district of Chiriqui, agree with Panama skins of the true *G. nudiceps*, Cassin. A little further north, in Costa Rica, the race Sclater and I described as *G. chiroleuca* is found, which extends onwards into Honduras.

91. FORMICARIUS HOFFMANNI (Cab.); J. f. Orn. 1861, p. 95; Salv. P. Z. S. 1866, p. 75.

Bugaba.

This bird seems to be much more abundant at Panama than further to the northward, as no additional specimens have been obtained in Costa Rica since the original examples were sent to Berlin by Dr. Hoffmann.

Grallaria princeps, Scl. & Salv. P. Z. S. 1869, p. 418. *G. guatemalensis*, Salv. P. Z. S. 1867, p. 146.

Calovevora; V. de Chiriqui.

Since describing this species, Arcé has sent us another specimen, agreeing accurately with the two from which our characters were drawn (*l. s. c.*).

Grallaria perspicillata.

Mina de Chorcha; V. de Chiriqui.

Pittasoma michleri.

Calovevora.

Grallaricula costaricensis.

Calovevora; Chitra.

Attila sclateri.

Calovevora; V. de Chiriqui.

92. PLATYRHYNCHUS ALBOGULARIS, Scl. P. Z. S. 1860, p. 68, et Cat. Am. B. p. 207; Salv. Ibis, 1869, p. 314.

Calovevora; Chitra; Calobre.

A specimen from Costa Rica (*Carmiol*) and others from the above localities agree accurately with Sclater's types of this species. As yet the bird has not been seen at Panama.

Platyrhynchus superciliaris.

Bugaba.

Todirostrum cinereum.

Calovevora; Calobre; Mina de Chorcha; Bugaba.

93. ONCOSTOMA CINEREIGULARE, Scl. P. Z. S. 1856, p. 295, et Cat. Am. B. p. 208.

Bugaba.

Here, as in Costa Rica, the northern race of this form prevails. At Panama we find *O. olivaceum*, Lawr.

94. EUSCARTHMUS SQUAMICRISTATUS (Lafr.); Scl. Cat. Am. B. p. 209.

Calobre; Chitra; Boqueti de Chitra; V. de Chiriqui.

This species, abundant in Veragua, appears to be equally common in Costa Rica, though at Panama it does not seem to occur.

95. LEPTOTRICCUS SUPERCILIARIS, Scl. & Salv. P. Z. S. 1868, p. 389.

Chitra; Calovevora.

As yet Arcé has not sent any additional specimens of this species.

96. MIONECTES OLIVACEUS, Lawr. Ann. Lyc. N. Y. ix. p. 111; Salv. Ibis, 1869, p. 314.

Calovevora; Chitra; Boqueti de Chitra; V. de Chiriqui.

Mionectes oleagineus.

Calovevora; Boqueti de Chitra; Bugaba.

97. LETOPOGON PILEATUS, Cab. J. f. Orn. 1865, p. 414. *L. amaurocephalus*, Scl. & Salv. Ibis, 1860, p. 399.

Calovevora.

98. LEPTOPOGON SUPERCILIARIS, Cab. in Tsch. F. P. p. 161, t. 10. f. 2; Scl. Cat. Am. B. p. 214.

Calovevora; Bugaba; V. de Chiriqui.

Specimens of this species have also been sent us from Costa Rica. They do not differ from Ecuadorean examples in Sclater's collection, which he has referred to this species, though Cabanis (Mus. Hein. ii. p. 55) has separated the New-Granadan bird as *L. poliocephalus*, without having reexamined Peruvian examples.

99. CAMPTOSTOMA FLAVIVENTRE, Scl. & Salv. P. Z. S. 1864, p. 358.

Bugaba.

A single specimen agrees with our Panama types. At Realejo, in Nicaragua, I found the more northern *C. imberbe*, Scl.

Tyranniscus parvus.

Calovevora; Chitra; Boqueti de Chitra; Bugaba; V. de Chiriqui.

Elainea subpagana.

Chitra.

100. ELAINEA FRANTZII, Lawr. Ann. Lyc. N. Y. viii. p. 173.

V. de Chiriqui.

Two specimens of this *Elainea* agree with a typical specimen received from the Smithsonian Institution.

101. ELAINEA PLACENS, Scl. P. Z. S. 1859, p. 46, et Cat. Am. B. p. 217.

Calovevora; Chitra; Boqueti de Chitra.

Legatus albicollis.

Chitra; Bugaba.

Myiozetetes columbianus.

Calovevora; Chitra; Bugaba.

Rhynchocyclus brevirostris, Cab. Orn. Not. i. p. 249; Scl. Cat. Am. B. p. 220. *R. griseimentalis*, Lawr. Ann. Lyc. N.Y. ix. p. 112.

Calovevora; Bugaba; V. de Chiriqui.

I am quite unable to detect any tangible differences between Costa-Rican, Veraguan, and Guatemalan specimens of this form. Whether *R. mesorhynchus*, Cab. J. f. Orn. 1865, p. 414, is really separable from *R. brevirostris* of Mexico, I have no materials to determine. There is a curious feature in the formation of the first primary in this group of the genus, which is not shared by the *R. sulphurescens* section: the shafts of the outer web are slightly recurved and pointed, and form a stiff pectinated edge. The determination of the sexes in our specimens is not very satisfactory; but as I find that a

number of specimens have the outer web of the ordinary type, I conclude that this peculiar feature is an attribute of the male only.

Rhynchocyclus flavo-olivaceus.
Calovevora.

Myiodynastes nobilis.
Chitra; Calobre; Bugaba.

102. HYPERMITRIS HEMICHRYSUS, Cab. J. f. Orn. 1861, p. 246.

Myiodynastes superciliaris, Lawr. Ann. Lyc. N. Y. viii. p. 470.
Chitra; Calovevora; Calobre.

Muscivora mexicana.
Calovevora; Mina de Chorcha; V. de Chiriqui.

Myiobius sulphureipygius.
Calobre; Bugaba; V. de Chiriqui.

103. MYIOBIUS ATRICAUDUS, Lawr. Ibis, 1863, p. 183.
Calovevora.

This species, as well as the last mentioned, occur in Veragua. A single specimen from the above locality quite agrees with Panama specimens.

Myiobius nævius.
Calovevora.

Myiobius erythrurus.
Bugaba.

104. MITREPHORUS AURANTIIVENTRIS, Lawr. Ann. Lyc. N. Y. viii. p. 174.
Calovevora.

105. EMPIDONAX ATRICEPS, sp. n.

Supra fuscus: uropygio et collo postico paulo dilutioribus, pileo toto nigro: alis et cauda nigro-fuscis, secundariis et tectricibus alarum majoribus sordide albo marginatis, rectricibus utrinque extimis extus albo limbatis: subtus ochraceo-fuscus, gula et ventre imo albicantibus, loris et macula postoculari albidis: campterio et subalaribus sordide albis: rostri maxilla nigra, mandibula flava, pedibus nigris: long. tota 4·5, *alæ* 2·3, *caudæ* 2·0, *tarsi* 0·6.

Hab. Volcan de Chiriqui (*Arcé*).

Obs. Species distincta, pileo nigro facile dignoscenda.

Arcé's collection from Chiriqui contains two specimens of this species, which, though a true *Empidonax*, is quite distinct in its coloration from any species I am acquainted with.

106. EMPIDONAX FLAVESCENS, Lawr. Ann. Lyc. N. Y. viii. p. 133.
Calovevora; V. de Chiriqui.

This species is closely allied to *E. bairdi*, Scl., but differs in

having a larger bill, and in the more ochraceous tinge of the upper and under plumage. The markings on the wings, too, are ochre, and not olivaceous as in *E. bairdi*.

107. EMPIDONAX FLAVIVENTRIS, Baird; Scl. Cat. Am. B. p. 229.
Calovevora.

108. CONTOPUS BRACHYTARSUS (Scl.); Cat. Am. B. p. 231.
Calovevora.

109. CONTOPUS RICHARDSONI (Sw.); Scl. Cat. Am. B. p. 231.
Calovevora; Bugaba; V. de Chiriqui.
This species has been recorded as occurring both in Costa Rica and Panama. I am not sure that I am right in referring these Veraguan specimens to *C. richardsoni*. The confusion in which these sombre-coloured *Contopodes* are involved makes their determination very unsatisfactory.

110. CONTOPUS BOREALIS (Sw.); Scl. Cat. Am. B. p. 230.
Calobre.

111. MYIARCHUS PANAMENSIS, Lawr. Ann. Lyc. N. Y. vii. p. 295; Scl. & Salv. P. Z. S. 1864, p. 360.
Calovevora.
A single specimen agreeing with Panama skins.

Myiarchus nigricapillus.
Chitra.

Tyrannus melancholicus.
Calovevora; Castillo; Calobre.

Milvulus tyrannus.
Calovevora; Castillo; Calobre.

Tityra personata.
Calovevora; Bugaba.

112. TITYRA FRASERI, Kp.; Scl. & Salv. P. Z. S. 1867, p. 757.
Bugaba.

113. PACHYRHAMPHUS ALBOGRISEUS, Scl. P. Z. S. 1857, p. 78.
Calovevora; Bugaba.
Specimens of both sexes, agreeing with Sclater's types.

Pachyrhamphus cinereiventris.
Calovevora; Bugaba.

Lipaugus unirufus.
Bugaba.

Lipaugus holerythrus.
Calovevora; Chitra; Boqueti de Chitra; V. de Chiriqui.

114. HETEROPELMA VERÆPACIS, Scl. & Salv. P. Z. S. 1860, p. 300.

Castillo; Calovevora; Bugaba; V. de Chiriqui.

Rather darker in colour than Guatemalan specimens (typical), but not otherwise distinct.

115. PIPRA MENTALIS, Scl.

Mina de Chorcha; Bugaba.

Pipra leucocilla.

Calovevora; Chitra; Boqueti de Chitra.

Pipra leucorrhoa.

Calovevora; Laguna del Castillo; Bugaba; V. de Chiriqui.

Pipra cyaneocapilla.

Bugaba; V. de Chiriqui.

Chiroxiphia lanceolata.

Castillo; Calovevora; Chitra; Boqueti de Chitra; Calobre; Mina de Chorcha.

116. CHIROMACHÆRIS AURANTIACA, sp. n.

Supra olivacea, pileo toto, interscapulio et alis nigris, collo postico et corpore subtus læte aurantiacis, primariis extus et cauda olivaceo indutis: rostro nigro, pedibus carneis.

Fem. *olivacea, uropygio et corpore subtus dilutioribus: long. tota* 3·8, *alæ* 1·8, *caudæ* 1·2, *tarsi* 0·75.

Hab. Mina de Chorcha et Bugaba (*Arcé*).

Obs. C. vitellinæ similis, sed statura minore, ventre aurantiaco nec olivaceo, et colore subtus saturatiore aurantiaco facile dignoscenda.

In the distribution of its colours this species much resembles *C. vitellina* (Gould); but the distinctions given above suffice to show that it must be considered a different species.

That a distinct race of *Chiromachæris* should now be found in Veragua is remarkable, seeing that in Costa Rica we find the Central-American *C. candæi*, whilst at Panama *C. vitellina* occurs.

Arcé has sent a sufficient number of specimens to prove that the characters given above are quite constant.

117. COTINGA AMABILIS, Gould?

Bugaba.

I doubt whether an immature specimen of a *Cotinga* from Chiriqui is really referable to *C. amabilis*; but as that species is stated to be found both in Costa Rica and at Panama, it is more than probable that it should also occur at Chiriqui.

This specimen is much darker than a female example of *C. amabilis* from Vera Paz; and the edgings of the feathers both above and below are pale cinnamon-colour, instead of grey. The tail, too, is tipped with the same colour.

Chasmorhynchus tricarunculatus.

Calovevora.

Cephalopterus glabricollis.
Calovevora; Calobre.

Momotus lessoni.
Chitra; Mina de Chorcha; Bugaba; V. de Chiriqui.

Momotus martii.
Calobre.

Ceryle amazona.
Calovevora; Chitra.

Ceryle cabanisi.
Calovevora; Calobre.

Galbula melanogenia.
Mina de Chorcha; Bugaba; V. de Chiriqui.

The southern range of this species does not seem to pass the district of Chiriqui. Arcé has not sent a single specimen from Calobre or any of the neighbouring localities.

118. MALACOPTILA PANAMENSIS, Lafr. R. Z. 1847, p. 79.

Mina de Chorcha; Bugaba; V. de Chiriqui.

After comparing together about forty specimens of *Malacoptilæ* from various parts of Central America and Western Ecuador, Mr. Sclater and I have come to the conclusion that it is not possible to distinguish more than two species within these limits. As already hinted in our paper on Panama Birds (P. Z. S. 1864, p. 363), the paler-plumaged birds (*M. inornata*, Du Bus, and *M. poliopis*, Scl.) are females of the rufous forms which we have hitherto referred to *M. veræpacis* and *M. panamensis*.

In the northern form, for which the term *inornata* is the oldest and must be adopted, the male is distinguishable by the rufous colouring extending nearly uniformly over the whole surface below, being slightly paler on the lower belly, and bearing very slight traces of dark markings on the margins of the feathers. In the southern form, for which the name *panamensis* must be retained, the breast alone is clear ferruginous, and is succeeded below by strongly mottled plumage, formed by the black lateral margins of each feather; the lower belly is pale fulvous, nearly white. These characters are still more strongly marked in the specimens from Western Ecuador in Sclater's collection. The females of the two forms are so exactly alike that it is not possible to distinguish them.

Of the northern form (*M. inornata*) all the specimens we have seen are from Guatemala. The birds from Costa Rica, Veragua, Panama, and Western Ecuador all belong to the southern form (*M. panamensis*), to which it seems *M. costaricensis* (Cab. J. f. Orn. 1862, p. 172) must be united.

119. BUCCO DYSONI, G. R. Gray; Scl. Cat. Am. B. p. 269.

Mina de Chorcha; Bugaba.

This species, though recorded both from Guatemala and Panama, has not yet appeared in the Costa-Rica lists.

Trogon caligatus.
Castillo; Calovevora.

120. TROGON BAIRDI, Lawr. Ann. Lyc. N. Y. ix. p. 119; Salv. Ibis, 1869, p. 316.

Bugaba.

We have now both sexes of this fine species, of which the male only appears to have been previously known. The female I now describe as follows:—

Schistaceo-nigra, alis caudaque paulo obscurioribus et extus, nisi in rectricibus quatuor mediis, albo transfasciatis: ventre et crisso coccineis.

121. TROGON PUELLA, Gould.

V. de Chiriqui.

Though found in Costa Rica, this is the most southern locality yet recorded for the occurrence of this species.

Trogon aurantiiventris.
Calovevora; Castillo.

The range of this species, which is abundant in the eastern parts of Veragua (Calovevora &c.), quite overlaps that of *T. puella*, a few individuals occurring as far north as Vera Paz. The two species are only to be distinguished by one having the underparts red, the other orange-yellow.

Trogon atricollis.
Calovevora; Chitra; Bugaba; V. de Chiriqui.

Trogon clathratus.
Calovevora.

The range of this species is now shown to extend to Costa Rica (Lawr. Ann. Lyc. N. Y. ix. p. 119).

Trogon massena.
Bugaba; V. de Chiriqui.

Pharomacrus mocinno.
Pharomacrus costaricensis, Cab. J. f. Orn. 1869, p. 313.
Calobre; Calovevora; V. de Chiriqui.

In an editorial note to Dr. v. Frantzius's paper on Costa-Rica birds, Dr. Cabanis proposed the separation of the Costa-Rican from the Guatemalan Quezal, and gave the former the name *P. costaricensis*. One of the distinctions pointed out consists in the number of elongated tail-coverts, the Guatemalan bird having, as stated, six, the Costa-Rican four. The former, too, is said to be of a more golden tinge on the upperside in certain lights, the latter being rather bluish. There can be little doubt that the tail-coverts attain a greater length and breadth in the Guatemalan bird; but the number which exceed the length of the rectrices is never more than four, though another pair of elongated feathers sometimes reach as far as the extremity of the tail. The length of these plumes varies much;

indeed their growth is seldom quite symmetrical; and therefore this character cannot be relied on as specific in every case. As regards the colour, I notice the difference pointed out in some instances, but not in all; so that this character, too, is untrustworthy. It is true that the general tendency of the Costa-Rican race is to have shorter and narrower caudal plumes than the Guatemalan; but this is all that can be said, and I do not think it possible to give unfailing characters by which the two races can be distinguished with certainty.

122. NYCTIBIUS JAMAICENSIS (Gm.); Scl. P. Z. S. 1866, p. 129.

A fine specimen of this species agrees with Jamaican examples in Sclater's collection, but is somewhat smaller than the Guatemalan skin, whose dimensions are given by Sclater (*l. c.*). Cabanis (J. f. Orn. 1869, p. 314, note) seems to consider *N. cornutus*, Vieill., distinct from *N. jamaicensis*, but assigns no reasons. Sclater places the former name as a synonym of *N. jamaicensis*, and looks upon the Jamaican and continental birds as one and the same species. As the dimensions of several specimens are given in Sclater's monograph, I add the measurement of this specimen: long. tota 15·0, alæ 11·0, caudæ 8·0, lat. rostri 2·2. It will be seen that these measurements almost exactly correspond with those of one of the Jamaican skins before referred to.

123. CHORDEILES POPETUE, Vieill.

Calovevora.

A single skin agrees with North-American examples. The species likewise occurs at Panama (Scl. & Salv. P. Z. S. 1864, p. 364).

124. ANTROSTOMUS CAROLINENSIS (Gm.); Scl. P. Z. S. 1866, p. 136.

V. de Chiriqui.

Also found in Guatemala and Costa Rica, but not southward of the point here recorded.

125. ANTROSTOMUS SATURATUS, sp. n.

♂. *Nigricans, rufo maculatus: alis nigris, extus solum rufo notatis, speculo alari nullo: subtus niger, rufescente transfasciatus, vitta gulari alba nulla, maculis albidis in medio ventre positis: cauda nigra rufo transfasciata: rectricibus tribus utrinque externis albo late terminatis, setis rictalibus longissimis: long. tota* 8·5, *alæ* 6·1, *caudæ* 4·8.

Hab. V. de Chiriqui (*Arcé*).

Obs. A. nigrescenti (Cab.) (Scl. P. Z. S. 1866, p. 138) affinis, sed rectricibus latiore albo terminatis, vitta quoque gulari et speculo alari absentibus, distinguendus.

This species, although I have compared it to *A. nigrescens*, belongs to section A of the *Antrostomi*, according to Sclater's arrangement (*l. c.* p. 136), having no white bar nor markings of any sort on the wing. It is of about the same size as *A. nigrescens*. The single skin sent does not show any white bar upon the throat but

there are slight indications of white markings, so that it is possible this band may be found in other examples.

126. STENOPSIS CAYENNENSIS (Gm.), Scl. P. Z. S. 1866, p. 140.

Calovevora.

A pair of Goatsuckers sent by Arcé agree fairly with the specimens thus named in Sclater's collection. The coloration of the tail, however, of the male exhibits rather less white than the Tobago specimen.

127. NYCTIDROMUS GUIANENSIS (Gm.); Scl. P. Z. S. 1866, p. 144.

Calovevora; Mina de Chorcha; Bugaba.

128. CHÆTURA ZONARIS (Shaw); Scl. P. Z. S. 1865, p. 609.

Chitra; Calovevora.

The occurrence of this species here was to be expected. No Swifts are recorded as found either in Costa Rica or Panama, though doubtless this species, *C. rutila*, Vieill., and the species I now describe may all be met with.

129. CHÆTURA FUMOSA, sp. n.

Fumido-nigra, abdomine paulo dilutiore, uropygio et gula cinerascente fuliginosis, cauda nigra: long. tota 4·5, *alæ* 4·1, *caudæ* 1·75.

Hab. Bugaba (*Arcé*).

Obs. C. cinereiventri similis, sed corpore subtus fuliginoso nec cinerascente distinguenda.

This species has a black tail like *C. spinicauda* and *C. cinereiventris*, but differs from both in the colour of the uropygium, which is smoky-orown, whereas in *C. cinereiventris* this portion of the plumage is clear ashy, and in *C. spinicauda* it is white. It is also darker beneath than either of these birds (see Scl. P. Z. S. 1865, p. 612).

Eutoxeres salvini, Gould, Ann. N. H. 4th ser. i. p. 455 (1868).
E. aquila, Salv. P. Z. S. 1867, p. 152.

Calovevora.

Arcé has sent specimens of this singular species in some numbers. The grounds on which Mr. Gould seeks to establish three species of this form, it must be confessed, are very slight; but as far as I can see (and I have examined a number of specimens), the characters given are quite constant. The present bird is the same as that figured in the 'Monograph of the *Trochilidæ*' under the name *E. aquila*.

130. GLAUCIS RUCKERI, Gould, Mon. Troch. i. t. 11, Intr. p. 39.

Mina de Chorcha.

This appears to be a rare species in Veragua, though more abundant

on the Panama Railway and in Costa Rica, the northern limit of its range.

131. PHAËTHORNIS LONGIROSTRIS (Delatt.); Gould, Mon. Troch. i. t. 19, Intr. p. 42.

Bugaba.

Two specimens of this common Central-American species have at last been obtained by Arcé. The bird seems also to be rare in Costa Rica, from which country I have received specimens since I wrote the note on *P. emiliæ* (P. Z. S. 1867, p. 152).

Phaëthornis emiliæ.

Calovevora; Boqueti de Chitra; Cordillera del Chucu.

132. CAMPYLOPTERUS HEMILEUCURUS (Licht.); Gould, Mon. Troch. t. 45, Intr. p. 52.

Calovevora; Chitra; Cordillera del Chucu.

By no means an uncommon species in Veragua. The specimens sent by Arcé differ in no way from Guatemalan and Mexican examples.

Phæochroa cuvieri (Delatt. et Bourc.); Gould, Mon. Troch. t. 52, Intr. p. 55.

Bugaba.

A single specimen only. The bird is common on the Panama Railway-line and about the eastern shores of the gulf of Nicoya in Costa Rica. In Guatemala this species is replaced by *P. roberti*, which, however, is only found in the forest-region of northern Vera Paz.

Oreopyra calolæma.

Calovevora; Cordillera del Chucu; V. de Chiriqui.

Oreopyra leucaspis.

V. de Chiriqui.

On reaching the volcano of Chiriqui, the locality whence Warszewiez obtained the original specimen of this species, Arcé procured an interesting series of skins of it. He writes me word that the females are like the females of *Oreopyra calolæma*, and have the breast cinnamon. If this view is correct, we should have three species with females very closely resembling one another, viz. *O. leucaspis*, *O. cinereicauda*, and *O. calolæma*; and then the true *O. castaneiventris* (*Anthocephala? castaneiventris*, Gould) will in all probability be the female of *O. leucaspis*. A close examination of a number of specimens of the so-called *O. castaneiventris* shows that Chiriqui specimens are of a brighter green above, and have the uropygium coloured uniformly with the back. In districts where *O. calolæma* alone occurs, specimens of the so-called *O. castaneiventris* have the back of a duller green, and the uropygium tinged with bluish; the bill, too, appears to be somewhat shorter. So far as our present knowledge extends, the geographical distribution of the three species is as follows:—*Oreopyra leucaspis* is restricted to the volcano of Chiriqui, *O. cine-*

reicauda is found only in the mountainous district round Cartago in Costa Rica, while *O. calolæma* embraces the range of both these species, and extends beyond into the district of Calobre in Veragua. Thus, if the females of these species closely resemble one another, we *ought* to find two varieties both around Cartago and Chiriqui, but only one in the vicinity of Calobre; and such to some extent appears to be the case. How far the females of *O. leucaspis* and *O. cinereicauda* differ, I have no means of showing; but I think that the differences pointed out above define the females of *O. leucaspis* and *O. calolæma*. On this view the birds which have been called *castaneiventris* must be assigned as follows:—

O. LEUCASPIS, Gould, P. Z. S. 1860, p. 312; Mon. Troch. iv. t. 264, Intr. p. 141. *Trochilus castaneiventris*, Gould, P. Z. S. 1850, p. 163. *Anthocephala castaneiventris*, Gould, Mon. Troch. iii. t. 203, Intr. p. 115. *Metallura castaneiventris*, Reich.

V. de Chiriqui.

According to the strict law of priority this bird should bear the name *O. castaneiventris*; but as this title applies only to the female, about which so much uncertainty exists, the more recent appellation *leucaspis* is much preferable.

The different stages of plumage of young males of *O. leucaspis* are very interesting. In some the white throat is only partially developed, the rest of the gorget being dark bronzy black. In others a few blue feathers are scattered over the white, but are more frequently seen, even in more adult birds, round the edge of the throat. Others, again, have green feathers rather thickly dispersed over the white, while the feathers of the crown show every shade from dull green to the brilliant coronet of the adult bird. According to Arcé's dissections, not one of these birds is a female; and I believe he is right, and that the young males, just as in *Eustephanus stokesi*, never assume, not even in the earliest dress, the female garb.

O. CINEREICAUDA, Lawr. Ann. Lyc. N. Y. viii. p. 485, et ix. p. 125. *O. castaneiventris*, Lawr. Ann. Lyc. N. Y. ix. p. 124 (? partim).

Mountains of Costa Rica (*Carmiol*).

The female of this species probably resembles that of *O. leucaspis* very closely. I have not seen any specimens of it as yet. Without examining all the Costa-Rica skins which have been called *O. castaneiventris*, it would be impossible to say whether females of the two Costa-Rica species have been confounded to constitute a third species; but I think it is not improbable. This point can only be settled by a reexamination of the skins in question.

O. CALOLÆMA, Salv. P. Z. S. 1864, p. 584, 1867, p. 153; Lawr. Ann. Lyc. N. Y. ix. p. 125. *O. venusta*, Lawr. Ann. Lyc. N. Y. viii. p. 484. *O. castaneiventris*, Salv. P. Z. S. 1867, p. 153; Lawr. Ann. Lyc. N. Y. ix. p. 125 (? partim).

V. de Cartago, Candelaria, Costa Rica; V. de Chiriqui, Cordillera de Tolé, Calovevora, Cordillera del Chucu, Veragua.

In the view I here adopt, all the cinnamon-breasted birds from Calobre &c. belong to this species. Whether all those collected in Costa Rica belong to the same remains to be seen. We have only two males as yet from the volcano of Chiriqui.

Lampornis veraguensis.
Calobre; Cordillera del Chucu.
This Humming-bird has a very restricted range, answering nearly to that of *Chiromachæris aurantiaca* described above. At Panama the common *L. mango* (Linn.) is found, and in Costa Rica the Guatemalan *L. prevosti* (Less.), *L. veraguensis* occupying a small area between the two.

Heliodoxa jacula.
Calovevora; Boqueti de Chitra.

Thalurania venusta.
Calovevora; Chitra; Boqueti de Chitra.

Microchera albo-coronata.
Cordillera del Chucu.

133. Lophornis delattrii (Less.); Gould, Mon. Troch. t. 121, Intr. p. 84.
Castillo; Laguna del Castillo.
Apparently common at certain seasons in this locality.

134. Lophornis adorabilis, sp. n.
Supra nitenti-virescens: dorso postico albo, uropygio purpureo tincto: alis brunneo-nigris: cauda rufa extus viridescente limbata et rectricibus mediis eodem colore terminatis: fronte et pileo medio albis, plumis illius erectis et cupreo terminatis, plumis hujus elongatis in fila productis et cristam albam formantibus: subtus gulæ totius viridescentis plumis lateralibus longissimis, supra dorsum retroductis; pectore albo, ventre et crisso rufis, illo antice viridescente mixto: rostri basi carnea, apice fusco, pedibus fuscis: long. tota 2·7, *alæ* 1·55, *caudæ rectr. med.* 1·0, *rectr. lat.* 0·9, *rostri a rictu* 0·55.
Fem. *capite et regione auriculari nigris: gula tota alba viridi-æneo parum punctata: cauda fascia lata subapicali nigra transvittata, rectricibus mediis medialiter viridescente tinctis: long. caudæ rectr. med.* 0·8, *lat.* 0·65.
Hab. Bugaba; V. de Chiriqui (*Arcé*).
This beautiful species is singularly distinct from any of its congeners, but perhaps belongs rather to the *L. magnifica* group than to that containing *L. helenæ*. In the whole genus, however, no other member has the erectile feathers on the forehead, the thread-like white plumes of the crest, or the long pointed feathers of the throat, which all combine to render this bird most distinct when compared with its allies.
The first specimen obtained by Arcé was a female, which, though

evidently belonging to a distinct species, I hesitated to describe. This specimen was shot at Bugaba. The last collection includes the male, which Arcé tells me his brother David obtained high up on the volcano of Chiriqui. That so fine a bird should have remained so long undiscovered seems singular; but the fact, I think, shows that the range of the species is extremely limited.

No less than two other species of *Lophornis* are found in this portion of Central America, viz. :—*L. helenæ*, the Mexican and Guatemalan bird, which is also to be met with in Costa Rica; and the southern *L. delattrii*, which seems to be abundant about Calobre and on the Isthmus of Panama.

Gouldia conversi.
Calovevora.

135. TROCHILUS COLUBRIS, L.; Gould, Mon. Troch. t. 131, Intr. p. 86.

V. de Chiriqui.

Though this species is found sparingly in Costa Rica, this is quite the most southern locality yet recorded for it, being doubtless the furthest point reached by a few individuals in their winter migration. Arcé has sent us a male in abraded plumage, and three females.

136. SELASPHORUS TORRIDUS, sp. n.

Supra virescens: alis purpurascenti-nigris: loris rufis, regione parotica rufa, nigro commixta: subtus gula tota nitente lilacino-rubra, plumis lateraliter elongatis: pectore, ventre medio et crisso albis, hypochondriis viridescente lavatis: cauda nigra, rectricibus lateralibus intus fere ad apicem rufo marginatis, rectrice extima utrinque macula parva in pogonio interno prope apicem rufa notata, rectricibus mediis viridescente lavatis: rostri maxilla nigra, mandibulæ basi carnea, pedibus fuscis: long. tota 2·7, *alæ* 1·6, *caudæ* 1·1, *rostri a rictu* 0·65.

Fem. *pileo obscuriore, plumis singulis totius gulæ fusco medialiter punctatis; hypochondriis rufescentibus: cauda nigra, basi rufa, rectricibus tribus lateralibus albo terminatis, tertia et quarta extus rufo marginatis, mediis omnino viridescentibus.*

Hab. V. de Chiriqui (*Arcé*).

The coloration of the throat of this species is peculiar, having a somewhat faded appearance. The tint is not brilliant red as in *S. scintilla*, nor does it resemble the gorget of *S. platycercus*, but is altogether of a more lilac hue. However, six males, sent by Arcé, are all so exactly alike that I cannot but suppose that the normal colour of the throat is shown. The lateral plumes of the throat, too, are elongated, reminding one of *Atthis heloisæ*, and thus render the species distinct from all *Selasphori* except *S. scintilla*, from which it differs widely in other respects. The most nearly allied species appears to be *S. flammula*, Salv. (P. Z. S. 1864, p. 586), which, however, has a differently coloured throat, as well as distinctive characters in the tail.

137. SELASPHORUS ARDENS, sp. n.

Supra viridescens: loris et regione parotica rufis, hac nigro mixta: subtus gula læte nitente rubra, sicut in Selasphoro platycerco: *pectore toto, ventre medio et crisso albis: cauda sicut in specie præcedente, rectricibus mediis purpurascenti-nigris rufo limbatis solum exceptis: rostro toto nigro: long. tota* 2·8, *alæ* 1·55, *caudæ* 1·15, *rostri a rictu* 0·65.

Mas hornot. *gula fusco maculata: cauda nigra, basi rufa et rectricibus quatuor externis rufo terminatis, mediis viridescentibus, rufo marginatis.*

Hab. Calovevora et Castillo (*Arcé*).

This species has the throat coloured just as in *S. platycercus*, which is in other respects a very different species. Its nearest allies, however, are *S. flammula* and *S. torridus*, described above; but it differs from both in the coloration of the throat, and also in having the central tail-feathers black, edged with rufous instead of green; this latter distinction is more conspicuous when the tail is compared with that of *S. flammula*. The wholly black bill and the absence of the elongated gular feathers distinguish it from *S. torridus*.

The male sent by Arcé is not in quite perfect plumage, but is so far satisfactory as to show a few faded feathers on the throat. These are bronzy, and quite different in colour from the gorget-feathers of either *S. flammula* or *S. torridus*.

Selasphorus scintilla.

V. de Chiriqui.

The original specimens of this species were obtained by Warszewiez in this locality, where Arcé seems to have found the bird occurring abundantly.

138. DORICHA BRYANTÆ, Lawr. Ann. Lyc. N. Y. viii. p. 483, et ix. p. 123.

Castillo; Laguna del Castillo; Cordillera del Chucu; V. de Chiriqui.

This fine species seems to be more abundant about Castillo than in the district of Chiriqui. Judging from the specimens sent by Arcé, the males are much more numerous than the females.

Clais merritti (Lawr.), Ann. Lyc. N. Y. vii. p. 110. *C. guimeti*, Salv. P. Z. S. 1867, p. 155.

Castillo; Calovevora; Chitra; Laguna del Castillo; Bugaba; V. de Chiriqui.

Mr. Gould tells me that he now considers the Central-American form of this bird to be distinguishable from southern examples. The distinction is indeed slight; but, so far as I can see, southern examples always have the blue of the head and throat considerably deeper in tint.

Heliothrix barroti.

Boqueti de Chitra; Bugaba; V. de Chiriqui.

I fail to detect amongst the species forwarded by Arcé from the above localities any specimens answering to the species described by

Gould as *H. violifrons* (*H. barroti*, Mon. Troch. t. 217; *H. violifrons*, Intr. p. 122), and conclude that Carthagena, and not Veragua, must be its proper habitat.

139. PETASOPHORA CYANOTIS (Bourc.); Gould, Mon. Troch. t. 228, Intr. p. 125. *P. cabanisi*, Lawr. Ann. Lyc. N. Y. ix. p. 126.

Calovevora; Chitra; V. de Chiriqui.

The differences pointed out by Cabanis and Lawrence between Costa-Rican and New-Granadan specimens of this bird appear to me to be exceedingly slight; and, so far as a considerable series of specimens show, the points of distinction are not so constantly present as seems requisite for the recognition of specific difference between the two races.

140. PETASOPHORA DELPHINÆ (Less.); Gould, Mon. Troch. t. 229, Intr. p. 125.

Calovevora.

This species is sparingly distributed throughout Central America, as far north as Coban in Vera Paz.

Heliomaster longirostris.

Calovevora; Chitra; Laguna del Castillo; Cordillera del Chucu.

Thaumantias chionurus.

Calovevora; V. de Chiriqui.

Amazilia riefferi.

Calovevora; Cordillera del Chucu.

Erythronota niveiventris.

Calovevora; Chitra; Cordillera del Chucu; V. de Chiriqui.

The range of this species seems almost entirely restricted to Veragua. We have a single specimen which was collected on the Panama Railway-line by the late Mr. J. M'Leannan.

141. EUPHERUSA EGREGIA, Scl. & Salv. P. Z. S. 1868, p. 389; Lawr. Ann. Lyc. N. Y. ix. p. 146.

Since the above species was described we have received numerous specimens, both from Costa Rica and Veragua. The adult bird is exceedingly like *E. eximia* of Guatemala, but seems to differ constantly in the greater amount of white on the rectrices. Mr. Lawrence has given (*l. c.*) a carefully drawn account of the specific differences between the two species.

142. EUPHERUSA NIGRIVENTRIS, Lawr. Proc. Ac. Phil. 1867, p. 232.

Cordillera del Chucu.

Arcé procured specimens of both sexes of this remarkable species in the above locality. The female, which has not yet been characterized, may be described as follows:—

Supra viridescens, pileo paulo obscuriore: subtus sordide alba, hy-

pochondriis vix viridescente tinctis : alis purpurascenti-nigris, secundariis ad basin rufis : cauda sicut in mari.

143. CHRYSURONIA ELICIÆ (Bourc. & Muls.).
Chitra; Bugaba.

144. DAMOPHILA JULIÆ (Bourc.).
Calovevora.

145. DAMOPHILA AMABILIS, Gould.
Bugaba; V. de Chiriqui.
Specimens from these places differ from Costa-Rica and Panama skins in having a longer bill, and apparently in the greater brilliancy of the lustrous crown. These differences are hardly sufficient to justify a separation of the species.

Sapphironia cæruleigularis.
Castillo; Laguna del Castillo; Calobre; Cordillera del Chucu.

Chlorolampis assimilis.
Castillo; Calovevora; Cordillera del Chucu; V. de Chiriqui.

Diplopterus nævius.
Calovevora; Chitra; Mina de Chorcha.

Piaya mehleri.
Castillo; Calovevora.

146. CROTOPHAGA SULCIROSTRIS, Sw.; Scl. Cat. Am. B. p. 320.
Calovevora; Castillo.

147. CROTOPHAGA ANI, L.; Scl. Cat. Am. B. p. 320.
Mina de Chorcha.
With the exception of the Antilles, this is the most northern locality yet recorded for this species.

Ramphastos carinatus.
Chitra.

148. RAMPHASTOS TOCARD, Vieill.; Scl. Cat. Am. B. p. 325.
Bugaba; V. de Chiriqui.

149. PTEROGLOSSUS FRANTZII, Cab. J. f. Orn. 1862, p. 333.
Bugaba; V. de Chiriqui.
This Toucan seems to be a very distinct species. Specimens sent by Arcé agree with others from Costa Rica. Can the bird called *P. erythropygius* by Mr. Lawrence, in his 'Catalogue of Hicks's Chiriqui Collection' (Ann. Lyc. N. Y. viii. p. 179), be the same species?

Selenidera spectabilis.
Calovevora.

Aulacorhamphus cæruleogularis.
Calovevora.

150. CAPITO BOURCIERI (Lafr.); Salv. Ibis, 1870, p. 111.

V. de Chiriqui.

Arcé has forwarded two specimens of this species, one of which is marked as a male.

151. PICUMNUS OLIVACEUS, Lafr.; Malh. Mon. Pic. t. 120; Sundev. Consp. Av. Pic. p. 104.

?*P. granadensis*, Lawr. Ann. Lyc. N. Y. vii. p. 333 (Panama).

Mina de Chorcha; Bugaba.

Both sexes of this species have been obtained by Arcé. These skins, and one we have from Panama, agree with New-Granadan (Bogotá) examples, which seem to answer fairly to Lafresnaye's description.

Campephilus hæmatogaster.

Calovevora.

Campephilus malherbii.

Calovevora.

152. PICUS JARDINII, Malh.; Sundev. Consp. Av. Pic. p. 17.

V. de Chiriqui.

Chloronerpes caboti.

Cordillera del Chucu.

153. CHLORONERPES CANIPILEUS (Lafr. & d'Orb.); Scl. Cat. Am. B. p. 339; Sundev. Consp. Av. Pic. p. 69.

Cordillera del Chucu; V. de Chiriqui.

Specimens from Veragua agree better with New-Granadan than with Costa-Rican and Guatemalan examples.

154. CHLORONERPES SIMPLEX, sp. n.

♀. *Oleagineo-virescens: pileo, gula et pectore paulo obscurioribus, nucha rubra: pectore viridi-albido guttato: abdomine pallide virescente, nigricante transfasciato: alis castaneis, extus dorso concoloribus, primariorum et secundariorum apicibus nigris, remigibus omnibus nigro transfasciatis: cauda nigra extus dorso concolori: tectricibus subalaribus castaneis: rostro et pedibus plumbeis: long. tota* 6·7, *alæ* 4·3, *caudæ* 2·6, *rostri a rictu* 0·95, *tarsi* 0·7.

Hab. Bugaba (*Arcé*).

Obs. C. aurulento affinis quoad alarum picturam, sed capitis coloribus valde distinctus.

This species, of which Arcé has as yet sent only a single female specimen, belongs to the same section as *C. aurulentus* (Licht.), inasmuch as the chestnut markings of the wing-feathers are interrupted by black bands (in this species, however, hardly reaching across the feathers). The absence of the yellow throat, the red rictal spot, and the yellow band stretching backwards from the base of the bill under the eye, render further comparison with that species unnecessary.

Judging from Mr. Lawrence's description of *C. callopterus* (Ann. Lyc. N. Y. vii. p. 476), this species would seem to be allied to the bird there described; but the characters given, such as the presence of "a yellow band from the bill, along the side of the head, under the eye, below which is a band of olive-brown; throat pale fulvous with dusky spots, and lower part of abdomen and under tail-coverts pale rufous," seem to preclude the possibility of the bird I now describe being the female of *C. callopterus*.

Chloronerpes ceciliæ.
Mina de Chorcha.

155. MELANERPES CHRYSAUCHEN, sp. n.

Supra niger, dorso medio et uropygio albis, illo nigro maculato: loris, fronte et nucha flavis, pileo medio coccineo: alis nigris, intus albo notatis, cauda nigra: subtus albidus, flavo lavatus, ventre medio coccineo, hypochondriis et crisso nigro transfasciatis: rostro et pedibus plumbeis: long. tota 6·5, *alæ* 4·5, *caudæ* 2·5, *rostri a rictu* 1·1, *tarsi* 0·7, *dig. med. cum ung.* 0·95.

Fem. *mari similis, sed pileo medio vitta nigra transfasciato, colore coccineo absente.*

Hab. Bugaba (*Arcé*).

Obs. M. flavifronti Vieill. similis, sed loris et nucha flavis, ventre imo solum coccineo facile distinguendus.

This well-marked species, of which Arcé has sent specimens of both sexes, seems certainly more nearly allied to the Brazilian *M. flavifrons* than to its nearer neighbours *M. cruentatus* and *M. rubrifrons*. From *M. flavifrons* it may be easily distinguished by the broader black band behind the eye, and by the lores being entirely yellow instead of black. Moreover in the present bird the throat is not so clear a yellow, and the red is confined to the lower belly and does not spread over the whole central portion of the abdomen.

156. MELANERPES FORMICIVORUS (Sw.); Scl. Cat. Am. B. p. 341.

V. de Chiriqui.

A single male specimen agrees with Costa-Rican, Guatemalan, and Mexican skins. Sundevall (Consp. Av. Pic. p. 51), following Malherbe, gives Panama as a locality for *M. flavigularis*, Scl. This I conceive to be an error, as no specimen of it has been yet sent by the collectors on the Isthmus; moreover this form of *Melanerpes* is only found in the highlands, *M. formicivorus* seldom descending below an elevation of 5000 feet above the sea-level.

Centurus tricolor.
Calovevora; Castillo; Chitra.

157. ARA MILITARIS (L.); Finsch, Papag. i. p. 396.

Calovevora.

158. CONURUS OCULARIS, Scl. & Salv. P. Z. S. 1864, p. 367.

Calobre.

The receipt of a number of specimens of this *Conurus* from Panama and Veragua shows that the species described (*l. c.*) as distinct from *C. pertinax* is, in these localities at least, quite constant in coloration. Admitting the difficulty in separating all the forms on which *C. pertinax*, *C. chrysogenys*, &c. are founded, I think that Dr. Finsch (Papag. i. p. 506) has gone too far in the opposite direction in uniting them all, even *C. xantholæmus*, Scl., under *C. pertinax*.

159. CONURUS HOFFMANNI, Cab.; Scl. & Salv. Ex. Orn. p. 161, t. 81; Finsch, Papag. i. p. 553.

V. de Chiriqui.

160. BROTOGERYS TOVI (Gm.); Finsch, Papag. ii. p. 99.

Bugaba; V. de Chiriqui.

161. CHRYSOTIS GUATEMALÆ, Hartl.; Finsch, Papag. ii. p. 562, t. 4.

Bugaba; V. de Chiriqui.

162. CHRYSOTIS DIADEMATA, Spix.

Calovevora; Bugaba.

Pionus menstruus.

Calobre; Mina de Chorcha; Bugaba.

163. IBYCTER AMERICANUS.

Mina de Chorcha.

164. MILVAGO CHIMACHIMA (Vieill.).

Calobre.

No member of this genus has hitherto been found so far north as Veragua, though we possess a specimen of the same species as the present from Chepo on the Isthmus of Panama, where it was shot by Arcé in 1864.

165. HERPETOTHERES CACHINNANS (L.).

Boqueti de Chitra; Calobre.

166. URUBITORNIS SOLITARIA (Tsch.), F. P. p. 94, t. 2; Verreaux, P. Z. S. 1856, p. 145.

Calobre.

The acquisition of an immature skin of this species makes another important addition to the *Accipitres* of Central America. The specimen is not in good condition and is an immature bird, but it agrees well with the bird described by J. Verreaux as in the immature dress of *Urubitornis solitaria*.

167. URUBITINGA ANTHRACINA (Nitzsch).

Chitra; Bugaba.

Spizaëtus ornatus.
Calovevora.

168. SPIZAËTUS TYRANNUS (Max.).

Calobre.

Leucopternis ghiesbreghti (Du Bus); Scl. & Salv. Ex. Orn. p. 121.
Calovevora; Chitra; Bugaba.

169. BUTEO BOREALIS (Gm.).

Chitra; Calobre; V. de Chiriqui.

170. BUTEO ALBICAUDATUS, Vieill.; Strickl. Orn. Syn. p. 35.

Calovevora; Chitra.

171. BUTEO PENNSYLVANICUS, Wils.

Boqueti de Chitra; Calovevora; Calobre; V. de Chiriqui.

172. BUTEO BRACHYURUS, Vieill. *Asturina brachyura*, Strickl. Orn. Syn. p. 42.

Calovevora.
Two specimens in adult (black) plumage. This species belongs to *Buteo* rather than to *Asturina*, the wings being longer and more pointed than those of typical *Asturinæ*.

Asturina ruficauda, Scl. & Salv. Ex. Orn. p. 175, t. 88. *A. magnirostris*, Salv. P. Z. S. 1867, p. 158.
Calovevora; Bugaba.

173. HYPOTRIORCHIS COLUMBARIUS (Linn.); Strickl. Orn. Syn. p. 92.

Calobre; V. de Chiriqui.
This northern species also ranges into South America, and has been found both in Venezuela and New Granada.

174. HYPOTRIORCHIS DEIROLEUCUS (Temm.); Pl. Col. 348.

Bugaba.
Arcé has sent a fine adult male specimen of this rare species, which, however, occurs both in Costa Rica and Guatemala.

Hypotriorchis rufigularis.
Calovevora; V. de Chiriqui.

Tinnunculus sparverius.
Calobre; V. de Chiriqui.

175. ACCIPITER BICOLOR (Vieill.); Scl. & Salv. Ex. Orn. p. 137, t. 69.

Chitra; Boqueti de Chitra; Calovevora; V. de Chiriqui.

176. ACCIPITER FUSCUS (Gm.).
V. de Chiriqui.

177. ISCHNOSCELES NIGER (Du Bus); Strickl. Orn. Syn. p. 125.
Mina de Chorcha.
All Central-American specimens of this form that I have seen have the dark plumage described under the above name.

178. MICRASTUR GUERILLA, Cass.; Scl. & Salv. P. Z. S. 1869, p. 367.
Calovevora.

179. MICRASTUR SEMITORQUATUS (Vieill.); Scl. & Salv. P. Z. S. 1869, p. 365.
Mina de Chorcha.

180. CYMINDIS CAYENNENSIS (Gm.); Strickl. Orn. Syn. p. 128.
Bugaba.

Ictinia plumbea.
Calovevora; Calobre.

Elanoïdes furcatus.
Calovevora.

181. CIRCUS HUDSONICUS (L.).
V. de Chiriqui.

182. BUBO VIRGINIANUS (Gm.).
Chitra.

183. SCOPS NUDIPES (Vieill.); Scl. & Salv. Ex. Orn. p. 102.
Calobre.
A specimen of this rare species from the above locality agrees accurately with the Costa-Rican specimen referred to in our article on this genus.

184. SCOPS BRASILIANUS (Gm.); Scl. & Salv. Ex. Orn. p. 102.
Calovevora; Chitra; Calobre.

Lophostrix stricklandi.
Bugaba.

185. PULSATRIX TORQUATA (Daud.).
Chitra; Castillo; Bugaba.

186. CICCABA VIRGATA (Cass.).
Chitra; Calovevora; Calobre; Bugaba.

187. CICCABA NIGROLINEATA, Scl. Trans. Z. S. iv. p. 268, pl. 63.
Boqueti de Chitra.
Two specimens, agreeing with others from Guatemala.

Glaucidium phalænoides, Vieill.
Calobre.

188. COLUMBA ALBILINEA, G. R. Gray.

Chitra; Boqueti de Chitra; Calovevora; Calobre; V. de Chiriqui. Agrees with New-Granadan and Costa-Rican specimens.

Columba rufina.
Calovevora; Chitra; Bugaba.

189. COLUMBA SPECIOSA (Gm.).

Bugaba.

190. COLUMBA SUBVINACEA, Lawr. Ann. Lyc. N. Y. ix. p. 135.

Calovevora.

191. COLUMBA NIGRIROSTRIS, Scl.

Bugaba.

Though these two species are found together in both Costa Rica and Veragua, they seem to be quite distinct, *C. subvinacea* being much more rufescent than *C. nigrirostris*.

192. ZENAIDURA CAROLINENSIS (L.).

Calobre.

Chamæpelia rufipennis.
Chitra; Calobre; Bugaba; Mina de Chorcha.

193. PERISTERA CINEREA (Temm.).

Calovevora; Mina de Chorcha; Bugaba.

194. LEPTOPTILA CASSINI, LAWR.

Bugaba; V. de Chiriqui.

Leptoptila verreauxi.
Calobre; Bugaba.

Geotrygon chiriquensis, Scl.; Scl. & Salv. Ex. Orn. p. 123, t. 62.
Castillo; Calovevora; Calobre; V. de Chiriqui.

195. GEOTRYGON MONTANA (Linn.).

V. de Chiriqui.

Chamæpetes unicolor, Salv.
Calovevora.

Ortalida cinereiceps, G. R. Gray, List Gall. in Brit. Mus. p. 12 (1867). *Ortalida poliocephala*, Scl. & Salv. P. Z. S. 1864, p. 371; Salv. P. Z. S. 1867, p. 161; Lawr. Ann. Lyc. N. Y. vii. p. 333, ix. p. 139.
Castillo.

Odontophorus leucolæmus.
Calovevora.

196. ODONTOPHORUS MARMORATUS, Gould; Scl. & Salv. P. Z. S. 1864, p. 371.

Bugaba.
Agrees with Panama specimens.

197. ODONTOPHORUS GUTTATUS, Gould.

V. de Chiriqui.

Tinamus robustus.
Bugaba.

198. CRYPTURUS MESERYTHRUS, Scl.; Scl. & Salv. Ex. Orn. p. 93, t. 47.

Chitra.

199. ARDEA CÆRULEA, L.

Castillo.

200. EGRETTA CANDIDISSIMA (Gm.).

Castillo.

201. BUTORIDES VIRESCENS (L.).

Chitra; Calobre.

202. TIGRISOMA CABANISI, Heine; Scl. & Salv. Ex. Orn. p. 95, t. 48.

Laguna del Castillo.

203. CANCROMA COCHLEARIA, L.

Mina de Chorcha.

Eurypyga major.
Cordillera del Chucu; V. de Chiriqui.

Parra melanopygia, Scl. P. Z. S. 1856, p. 283.
Calobre; Castillo.

204. PARRA HYPOMELÆNA, Gray & Mitch. Gen. B. t. 159; Scl. P. Z. S. 1856, p. 283.

Calobre.

Both these species have been sent by Arcé. They are much more nearly allied than appears at first sight. Some specimens of *P. hypomelæna* show purple-brown feathers on the back, and thus indicate a tendency to the assumption of an intermediate state of plumage leaning towards *P. melanopygia*. I think it probable that a large series of specimens would show every gradation of plumage between *P. hypomelæna* and *P. melanopygia*, including also *P. intermedia* (described in Sclater's paper, *l. c.*).

In Costa Rica the true *P. gymnostoma*, Wagl., occurs, which may at once be distinguished by the frontal caruncle being divided posteriorly into three lobes, and by the total absence of the rictal caruncle.

205. PORZANA CAROLINA (L.); Scl. & Salv. P. Z. S. 1868, p. 450.
V. de Chiriqui.

206. FULICA AMERICANA, Gm.; Scl. & Salv. P. Z. S. 1868, p. 468.
Laguna del Castillo.

207. ÆGIALITES VOCIFERUS (L.).
V. de Chiriqui.

208. GAMBETTA MELANOLEUCA (Gm.).
Chitra.

209. RHYACOPHILUS SOLITARIUS (Wils.).
Castillo; V. de Chiriqui.

210. GALLINAGO WILSONI (Temm.).
Chitra.

211. QUERQUEDULA DISCORS (L.).
Laguna del Castillo.

212. FULIGULA AFFINIS (Forst.).
Castillo.

213. PHALACROCORAX BRASILIANUS (Gm.).
Phalacrocorax, sp. ?, Salv. Ibis, 1866, p. 200.
Castillo.

214. PLOTUS ANHINGA (Linn.).
Castillo.

215. PODILYMBUS PODICEPS (Linn.).
Castillo.

216. PODICEPS DOMINICUS (L.).
Castillo; Chitra.

April 28, 1870.

John Gould, Esq., F.R.S., V.P., in the Chair.

The Secretary called the attention of the Society to the following additions to the Menagerie during the month of March:—

1. A male specimen of Sclater's Impeyan (*Lophophorus sclateri*), presented by Major Montagu, Bengal Staff Corps, and received March 12th.

2. A male Blyth's Tragopan (*Ceriornis blythi*), presented by the same gentleman, and received on the same date.

Mr. Sclater had already read before the Society his notes on these two interesting birds (see *anted*, p. 162).

3. Four young Hornbills, which had been obtained by Mr. William Jamrach during his recent visit to Malacca and Sumatra, and appeared to be all young birds of the last breeding-season. Two of these Mr. Sclater had provisionally determined as being a male and a female of the Plait-billed Hornbill (*Buceros plicatus*), although it appeared possible that the smaller female bird obtained at Malacca might be referable to the nearly allied species *Buceros subruficollis* of Blyth, if, indeed, this were really to be considered distinct from *B. plicatus*. The third Hornbill, from Sumatra, appeared undoubtedly referable to the female of *Buceros gracilis* (Temm. Pl. Col. 535); the fourth to *Buceros bicornis*.

4. Four Burrowing Owls (*Pholeoptynx cunicularia*), presented by George Wilks, Esq., C.M.Z.S., of Buenos Ayres, and received March 19th, being the only specimens of this interesting species ever received, except the one previously presented by Mr. Wilks in 1868 (*cf.* P. Z. S. 1868, p. 261).

5. A Wood-loving Antelope (*Cephalophus sylvicultrix*), purchased of a dealer March 24th, and believed to be the first specimen of this beautiful Antelope, which was formerly living in the Knowsley Menagerie, ever received by the Society.

Dr. E. Hamilton communicated the following extract from a letter lately received from his nephew, Capt. Francis Hamilton, of the 21st Regt., commanding detachment at Port Blair, Andaman Islands:—

"All of us here have been much amused by the account of the so-called 'Andaman Monkey' (*Macacus andamanensis*) lately received by the Zoological Society*. But in point of fact there are no Monkeys indigenous to the Andaman Islands. One of the superintendents brought some Monkeys to this island (Ross), which got loose; and 'Andaman Jenny' is one of them. There are three others still left; they live among the commissariat sheds. There are two old ones and one young. They were brought from the mainland of Burmah."

The following extract was read from a letter addressed to the Secretary by Dr. J. Anderson, F.Z.S., dated Indian Museum, Calcutta, 15th March, 1870:—

"I have succeeded at last in procuring a specimen of the Irawady Dolphin from Bhamoo, six hundred miles from the sea. I am indebted to my friend Capt. Burns for it. He found it newly stranded on an island opposite Bhamoo, and, according to my instructions, had it packed in salt and arsenic and sent down by a special boat to Mandalay, whence it was forwarded to me by steamer. It arrived in capital condition after a journey of twelve hundred miles.

"It belongs to the genus *Globiocephalus*, and internally has all the characters of *G. indicus* of Blyth; but its skull has certain well-marked features that separate it from the latter.

* See P. Z. S. 1869, p. 467.

"My specimen measured seven and a half feet in length, and, from its much worn teeth and the condition of its skull, appears as if it had attained full growth, whereas *G. indicus* reaches up to from fifteen to twenty feet in length. I have only just received it; so I am not in a position to say much about it.

"Before this specimen reached me I was fully convinced, from my observations on the Irawady, that its Cetacean was a round-headed species."

Mr. Harting exhibited an unusually fine specimen of the Dusky Redshank (*Totanus fuscus*) in summer plumage. This had been stated to have been killed on the Thames, near Surbiton, but was subsequently discovered to have been sent from Holland.

The Rev. H. B. Tristram exhibited two skins of *Luscioniola melanopogon* (Temm.), killed by Mr. Brookes near Etawah (north of Agra) in Central India, being the first instance of this rare species having been obtained in India. Mr. Tristram also exhibited some other rare Indian warblers.

The following papers were read:—

1. Description of a gigantic Amphibian allied to the Genus *Lepidosiren*, from the Wide-Bay district, Queensland. By GERARD KREFFT, F.L.S., C.M.Z.S., Curator and Secretary of the Australian Museum, Sydney, New South Wales.

The discovery of a species of *Lepidosiren* in Australia will no doubt take the scientific world by surprise—the more so as this newly found amphibian has a dentition different from that of *Lepidosiren*, and closely resembling the teeth of certain fossil Sharks described by Agassiz under the generic term of *Ceratodus* (Recherches sur les Poissons Fossiles, tome iii. p. 129). On this ground, and being convinced that the various species of animals classed under the name of *Ceratodus* were not sharks, but amphibians, I shall adopt Prof. Agassiz's name, and describe the Australian amphibian, in honour of its discoverer, the Hon. William Forster, M.C.A., as

CERATODUS FORSTERI.

In general shape the specimen before me (fig. 1), which is somewhat mutilated and without intestines, resembles the *Lepidosiren annectens*. It is nearly 3 feet in length, has a broad flat head, small eyes, and four limbs in the shape of flappers. The body is covered with large cycloid scales, ten rows on each side, the third row from above marked, but not very distinctly, as a lateral line. There is a large gill-opening before each pectoral limb, containing well-developed branchiæ (on account of the state of the specimen, however, a careful examination of them was impossible), and a rather large pair of

Fig. 1.

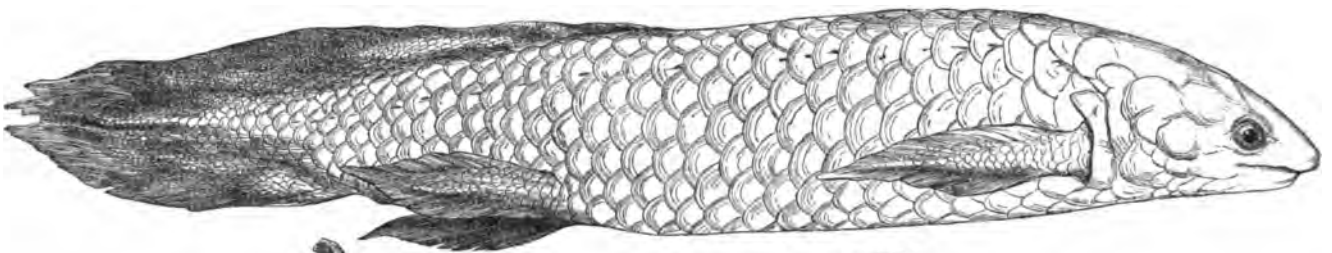


Fig. 3.



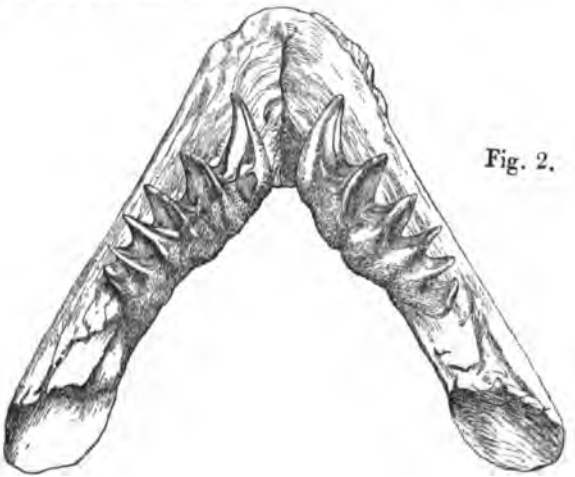


Fig. 2.

Fig. 1. *Ceratodus forsteri*, side view.
Fig. 2. Lower jaw of ditto, from above.
Fig. 3. Left ramus of lower jaw, seen from the front. *s*. Symphysis.

nostrils just below the upper lip, communicating by a short tube with the roof of the mouth.

The skeleton is partly ossified, partly cartilaginous, the vertebræ being pure cartilage, and the ribs hollow tubes filled with a cartilaginous substance. The palate and upper part of the skull are bone, and the head is covered with two enormous scales. The tongue is very small, and attached to what I believe to be a large hyoid bone ossified externally. The rays which support the dorsal and caudal fins consist of two or more quill-like hollow tubes filled with and held together by cartilage. Numerous rays branch off from the limbs, forming broad flappers, which have some resemblance to those of a Porpoise, but are covered with small scales. The teeth are very interesting; and the dental plates will be found in form (and substance, probably, also) to approach the teeth of the genus with which I have provisionally classed this animal.

The incisors are two, restricted to the upper jaw; they are flat, slightly bent, with the upper front margin cut away and the hinder one denticulated. A little behind the incisors the first and largest limb of the dental plate appears; it is almost parallel with the palate; the second joint or limb branches outward, being smaller than the first, and so on to the sixth and last, which is only half the size of the fifth. The inner margin of the dental plate is rounded off; and the two together form a triangle (if a line is drawn at their base) with serrated outer sides. The lower jaw (fig. 2) is provided with corresponding plates; the incisor teeth are wanting, and the two rami are only joined by tough skin. The opening of the mouth is not very large; and the jaws appear to work in a curious manner, which is best described by working two sections of a cog-wheel horizontally, one down upon the other, to which motion the flexibility of the lower jaw appears to be well adapted.

This short description of one of the most interesting animals ever discovered in Australia must suffice at present. I have no doubt that many and better accounts will be given of it when well-preserved spirit-specimens have come to hand.

Postscript.—It is strange that a curious creature like this, which was well known to the early settlers at Wide Bay and other Queensland districts, should so long have escaped the eyes of those interested in natural history. I remember that Mr. William Forster mentioned a "fish" with cartilaginous backbone years ago, and that I expressed an opinion that he must be mistaken. This animal is excellent eating, has Salmon-coloured flesh, and at certain seasons will rise to a fly; so that the northern squatters have named it the Burnett or Dawson Salmon, from its habits and from the rivers in which it is principally found. The poor bush-cooks who dressed these "Salmons" could have made a small fortune, had they preserved the heads and sent them to Sydney.

It is only during certain seasons that this amphibian takes bait; at other times it cannot be induced even to nibble. I think, however, that during this latter period the animals are buried in the

mud. The native name is *Baramoondu* or *Baramoondi*. We know as yet nothing about its habits, or the metamorphoses the young undergo; and I have been informed that the specimen from which the present description is taken is by no means a large one. Mr. Forster tells me that he has heard of specimens taken in the Dawson fully 6 feet in length.

2. On the Mammals of Hainan.

By R. SWINHOE, F.Z.S.

(Plate XVIII.)

On the 9th of December, 1869, I had the pleasure of reading before the Society a paper on the Cervine Animals of Hainan. I now desire to give a list of the remaining Mammals that I saw or heard of during my visit to that island.

1. BLACK APE. *Hylobates pileatus*, Gray, P. Z. S. 1861, p. 136, pl. XXI.? *Wooyuen* of the Chinese of Hainan.

In the Chinese Gazetteer of the Kiungshan district of Hainan I found among the list of Mammal products of the island a species of Gibbon thus described:—"Yuen. Male black, female white; like a Macaque but larger, with the two forearms exceedingly long. Climbs to tree-tops and runs among them backwards and forwards with great agility. If it falls to the ground, it remains there like a log. Its delight is in scaling trees, as it cannot walk on the ground. Those desiring to rear it in confinement should keep it among trees; for the exhalations of the earth affect it with diarrhœa, causing death; a sure remedy for this, however, may be found in a draught made of the syrup of fried Foo-tsze (seeds of *Abrus precatorius*, Linn.)." An extract from the work *Pun Yu liang che* is here inserted, giving the various Yuens known to the author:—"There are three kinds of Yuens—the Golden-Silk Yuen, which is yellow, the Jade-faced Yuen, which is black, and the Jet-black Yuen, which has the face also black. The Golden-Silk and the Jade-face are both difficult to procure." The Gazetteer then continues:—"Hainan has also the Rock-Yuen. It is small, about the bigness of one's fist. If allowed to drink water, it grows in size. This is also called Black Yuen, and is now likewise difficult to obtain."

In a later edition of the Gazetteer the following is added:—"From its love for climbing and its mild disposition it is called *Yuen*" (two meanings of the phonetic part of the character). The work *Pe-ya* remarks, "The Yuen does not usually walk along the ground;" the Gazetteer therefore observes that it cannot walk; but those that have lately kept it in confinement have noticed that it occasionally drops on to the ground of its own inclination, and runs backwards and forwards in as lively a manner as the Meshuy [*Loris gracilis* (Shaw)]. We consequently cannot accept the statement in the Gazetteer.



Du Halde (Description de la Chine, A.D. 1735, tome i. p. 230), in an account of the natural productions of Hainan, writes:—"Among the animals that the island produces is seen a curious species of Great Black Ape, whose physiognomy somewhat approaches the human face; so well are the features marked; but this species is rare."

Having learnt of the existence of this Black Ape in Hainan, I naturally never ceased to inquire after it. Every one knew that such an animal did exist, and many had seen it; but they all spoke of the great difficulty of keeping it alive. At Taipingsze (Central Hainan) the wonderful stories that were told about it showed that the Yuen was not often seen there. The magistrate of that district assured me, with a serious face, that it had the power of drawing into its body its long arm-bones, and that when it drew in one arm it pushed out the other to such an extraordinary length that he believed the two bones united in the body; and he said that the bones of the arm were used for chopsticks. At Lingshuy (S.E. Hainan) the magistrate knew the animal and had kept it alive. His military colleague was in the hill-districts, but he would be back in a few days; and if we could wait, the magistrate thought he could get us a live specimen of the Ape. At all events, he would procure the animal and take it with him for us to Canton, whither he hoped to go before long. We could not, of course, wait, and we never heard of the mandarin or his good intentions again. At Nychow (S. Hainan) the commodore's secretary told me that only a few days previous to our visit he had had one alive, but that it had died, and he had had it buried. At my request he had the remains looked for. The top of the skull was all that was found; the dogs had destroyed the rest. He gave me this fragment, as also a pair of *ulnæ* of an older animal, which he was going to turn into chopsticks (the Chinese "knife and fork," so to speak). On our return to the capital of Hainan a rumour reached us that one existed in confinement in the city. The admiral there took the matter in hand and did his best to secure it for us. But the rumour was false; no such animal could be found; so we had to leave Hainan with only the fragments above mentioned of this much desired Wooyuen.

The portion of the skull obtained is that of a very young animal, and is therefore of not much value for determining the species. But the *ulnæ* are apparently adult, and are certainly those of a species of *Hylobates*.

Length of ulna of adult 11·4 inches.

On the 9th of April, 1861, a paper was read by Dr. J. E. Gray before this Society on a collection of Mammals &c. made by M. Mouhot in Cambodia (P. Z. S. *l. c.*), in which a species of *Hylobates* (*H. pileatus*) was described from an island off Cambodia. There is a fine stuffed group of this in the Mammal Gallery of the British Museum, showing the varieties of colour spoken of by the Chinese author, which, as Dr. Gray points out, are due to age and sex. This species from Cambodia must be closely related to, if not identical with, the Wooyuen of Hainan.

The jet-black Rock-Yuen referred to in the Gazetteer may possibly

be *Presbytes maurus* (Schreber). There is a specimen of this in the British Museum, brought from Canton by Mr. J. Reeves.

2. THE REDDISH-GREY MONKEY. *Macacus erythræus* (Schreber).

Du Halde (*op. cit.*) says that in Hainan "there are Grey Monkeys, which are very ugly and very common." The Chinese Gazetteer has the following:—"*How* (or Monkey). The *She-show* (Notes on Animals) states that the Monkey has no stomach, but digests its food by jumping about. According to ancient authors, *Kiungchow* abounds in Monkeys, and its people make a trade by selling young ones."

About the jungles of Nychow (S. Hainan) Monkeys were very common. On our landing, abreast of the ship we saw a large party of them on the beach, which at once retired into a grove above high-water mark. We watched them running along the boughs of the trees and jumping from branch to branch. The discharge of a fowling-piece soon made them scurry away into the thicket; but every now and again their heads would appear from the higher bushes watching the movements of the enemy. At last, when they observed that our presence implied actual danger to themselves, they climbed the hills and posted themselves about conspicuous rocks, where they chattered and grunted out of danger. Their cries were very like those of *Macacus cyclopis*, mihi, of Formosa. In the neighbourhood of Nychow city we found a large number of them in a thick wood that surrounded the hovel of a *Le* native, and one of our party succeeded in knocking over a fine female with a cartridge. Its irides were yellowish brown tinged with green. Eyes somewhat oval. Face long, narrow, with a somewhat projecting mouth; the skin tinged with reddish yellow, and sprinkled with short silky buff-coloured hair, longer and coarser on the lips, chin, and cheeks. A few long black hairs were scattered on the centre of the forehead and on the space beneath the eyes. The ear was well developed, and thinly clothed with hair.

Skull, ♀.—The mouth projects 1 inch in front of the line of the orbital ridge. Height of the skull, from top of frontal bone to angle of the lower jaw, 2·6 inches; from orbital ridge to the same 2·43; length of lower jaw 2·15; hind corner of malar arch to front of incisors 2·45; from ditto to occipital crest 1·5; greatest diameter of rounded orbit ·9; breadth of skull, from one malar arch to the other, 2·6; across base of brain-case 2·25. Nasal aperture shaped like a subverted cone; vertical length ·65, greatest breadth ·42. Central pair of incisors of upper jaw about one-third larger than those of lower. Only fourteen teeth in each jaw; the four hind molars not yet acquired. The frontal bone slopes rapidly backwards from the orbital ridge, rising only a little in its centre, and thus leaves a very inclined forehead.

Vertical length of ear 1·3, breadth ·9; bare palm 1·85 long, 1·1 broad; middle finger 1·2 long; length of sole 3·2, breadth 1·5.

Length of body 15 inches; of entire arm to tips of fingers about

10; of leg about 11; of tail 7, thin, with harsh adpressed hair projecting 1½ inch beyond tip of bone.

The short coarse hair of the head commences from the orbital ridge, leaving no forehead. Head, arms, and back olive-grey, rufescent on the first and last, browner on the arms. Fingers clothed to end of first digits, the rest bare and fleshy-brown in colour, with a few scattered hairs and long brown claw-like nails; basal portions of the hair bluish grey. Under neck, breast, and belly dingy yellowish. Rump, thighs, and base of tail yellowish chestnut; yellowish brown on legs, feet, and rest of tail. Toes covered with longish hairs. Buttocks bare—with a bright red callosity on each side, of an irregular oval form, with the smallest end downwards, 1 inch long by ·6 in greatest breadth.

The Chinese General at Nychow (S. Hainan) gave me a live young specimen of this species; but, as it had had its tail chopped off, I did not trouble to have it forwarded to England.

Judging from the single adult female brought home by me, the Hainan Monkey does not appear to be separable from the *Macacus erythræus* (Schreber) of Bengal, of which there are many examples in the Society's Gardens.

3. House-bat. *Vesperugo abramus* (Temm.) [*V. akokomali*], Monograph. de Mamm. t. ii. p. 232.

I only procured one small Bat at Hainan—the species which roosted under the eaves of the house in the city wherein I was quartered. Dr. Peters, of Berlin, has kindly determined the species. It is a common House-bat in Nagasaki, Japan.

The Gazetteer places the Bats at the end of the list of birds, as is usual with Chinese authors, and says, "Peenfoo, or Bat, shaped like a Mouse, has thin flesh-wings uniting the four legs and extending to the tail. In winter stows away; in summer comes out. In daytime lies prostrate; in night flies. One name for it is Foo-yeh, or Belly-wings. It is now called the Feishoo, or Flying-mouse."

4. Asiatic Civet. *Viverra zibetha*, L.

The Indian Civet occurs in China from Canton to Shanghai. I have not detected it in Formosa. In Hainan I procured two flat skins at *Lingmun* (Central Hainan), a place of barter between the Chinese and the independent *Le*. One is that of a full-sized animal, the other of one about two-thirds grown. The younger animal is blacker between the shoulders, with distinct markings on the sides and rump. In the older animal these markings have almost entirely disappeared. This is mentioned in the Gazetteer as the *Heangle*, or Fragrant Fox.

5. The Little Civet. *Viverricula malaccensis* (Gmelin).

I obtained a skin of this animal at the same place as the last. Its black markings are somewhat confused. It is a common species in South China, as well as in Formosa. The Gazetteer calls it the *Mao-hwa-le*, or Fox with cat-like markings.

6. THE MUNGOOS. *Herpestes*, sp.?

One evening at Kiungchow I observed a Mungoos running along a bank outside the city wall. Later on I saw a skin of apparently the same species hanging up in a garden at Shuyweisze (Central Hainan) to serve as a scarecrow. Its hair was yellowish grey mottled with black. I cannot from recollection identify the species. I have not noted any species of *Herpestes* in China; but Dr. Gray has described an *Herpestes rutilus* from Cambodia (P. Z. S. 1861, p. 136). The Mungoos is, I think, the *Cha-le* of the Gazetteer.

7. THE CLOUDED TIGER. *Felis macrocelis* (Temm.). *Neofelis macrocelis*, Gray, P. Z. S. 1867, p. 266.

The skin of this Cat was shown to me in the mountains as having been procured in that neighbourhood; and I was told that the true Leopard also occurred in Hainan. The Hainan Gazetteer admits both species. It says, "Pao, or Leopard, resembling a Tiger in form, with white face and round head. Those with spots like cash (Chinese coin) are called the 'Golden-cash Leopard' (*Leopardus varius*); those with spots shaped like the mint-leaf are called 'Mint Leopard' (*L. macrocelis*). They dread Snakes. The poet Hwai Nantsze has the following couplet:—'Snakes command the Leopard to stand: all creatures have their masters.'"

8. THE MUSKY TREE-CIVET. *Helictis moschata*, J. E. Gray, P. Z. S. 1830, p. 94; 1865, p. 153.

I have but one skin from Hainan, which wants the large white spot between the eyes. The white line from between the ears to beyond the shoulders is narrow and indistinct. The dark parts of the head are brown, without any tinge of blackish. Hind neck, front of fore and hind legs plain brown, without the white grizzly appearance; the brown is darker on the hind neck and between the shoulders; the down at the root of these hairs light brownish buff. The under parts, cheeks, and ears are pale buff, deeper-coloured on the down beneath. Whiskers brown; a few of the shorter ones white.

The British Museum has a specimen from Canton, which is coloured like ours and wants the nasal white spot.

9. THE CHINESE OTTER. *Lutra chinensis*, Gray.

Skin of an animal about half-grown. Hair short, with down at roots. Upper parts brown, with down of lighter shade; the brown extending to the muzzle, down the front of the legs over the toes; tail the same colour. Sides of face and underparts generally brownish white, with light-buff-brown down. Ears small and rounded, edged with brownish white; the whiskers about the muzzle and face the same colour. Claws light brown. This seems to be the same as the Otter found throughout South China, which Dr. J. E. Gray has distinguished from the Indian Otter (*L. indica*, Gray).

"*Tà*, like a Dog, but with a bristly mouth, hair fine; enters water without getting wet; delights in catching fish."—*Gazetteer*.

10. The Clawless Otter. *Aonyx leptonyx* (Horsf.). *A. horsfieldi*, Gray, Mag. Nat. Hist. i. p. 580 (1837).

I heard of a second species of Otter in Hainan that lived among the mountains. The Gazetteer speaks of it thus:—"There is a race produced by the mating of the common Otter with the female *Yuen* (*Hylobates*), called the *Cha-kia* (Mountain-Otter). Their bones are found in caverns, and yield an antidote to the poison used on arrow-heads by the savage tribes. People wounded by arrows grind to powder a small quantity and apply it to the wound; the powder at once stops the effect of the poison." I procured three skins of this animal at the trading-station above referred to, and saw at once that it was quite distinct from the common Otter.

Two of the skins are of adults, the third of an animal about two-thirds grown.

There appear to be two groups of Otters with minute pointless claws classed under the genus *Aonyx*, the one to be distinguished from the other by longer and more fully webbed toes. To the former of these belong *Lutra leptonyx*, Horsf., from Java, and *Aonyx horsfieldi*, Gray, from Malacca; which two Dr. J. E. Gray subsequently united as *Aonyx leptonyx* (P. Z. S. 1865, p. 130). To the latter belong the *Lutra indigitata*, Hodgs., from Nepaul, and certain specimens in the Museum from Madras.

My Hainan skins agree in the form of the foot and in the texture of the fur with the fine specimen from Wellesley (Malacca) on which Dr. Gray founded his *Aonyx horsfieldi*; but the tail in the Hainan race is much longer, and it wants the pure white throat of the other, and differs also in the tone of its brown colouring. The skull of the Malacca specimen is in the skin. The Hainan race appears to me to be distinct from this, apparently, its nearest ally; but it is impossible to establish a species of Otter without a comparison of skulls, and I have none of the Hainan kind. I will therefore content myself with giving a description of the appearance of the skins.

Adult. General colour rich brown, except the throat, underneck, and breast, which are whitish, the down of the latter parts being light brown. Hairs shorter and the down more abundant than in *Lutra chinensis*. Down of the upper parts the same rich brown on surface as the hairs, whitish at base. Ears small and oval, the same colour in front and behind as the back, with a pale outer edge. Muzzle and cheek-whiskers stiff and brown. Length from muzzle to root of tail 20 inches; length of tail 13 inches; from ear to eye 2 inches, from eye to nostril 1·25. The hind feet alone are remaining; their claws are without points, and truncated, the toes are well webbed, and there is a broad hollow space between the sole-pads and the ends of the toes. Sole-pad to tip of fourth toe ·9; length of sole 1·9, greatest breadth ·75.

The young animal is softer and washed with buff throughout. Its ears have no light edging; and its throat, underneck, and breast are light brownish chestnut. Its whiskers are blacker.

From *L. chinensis* the Hainan *Aonyx* differs in the texture and

colour of its fur, in its broader and flatter ear, its minute abrupt nails, and its much smaller size.

By its long well-webbed toes and shape of underfoot it approaches *Lutra*; but in the blunt form of the claws it is a true *Aonyx*. The first toe of the hind foot is proportionally much longer than in *L. chinensis*; its second and fifth are nearly equal, reaching to the middle of the second digit of the third and fourth toes, which are also nearly equal in length. The immature skin has the right hind foot remaining, which shows the same build of toes and nails.

While at Amoy in 1867 I procured a live Otter, from a ship which brought it from Saigon, Cochin China. When alive it was very tame, and followed its keeper about like a Dog. It was handled and caressed without its ever attempting to bite; but when put into a cage, or otherwise confined, it uttered a loud unceasing cry, which was most annoying. From the shortness of its head and its small size it was distinguishable at a glance from the common Chinese species. It would eat almost any thing in the way of food. This specimen has the peculiar short claws of *Lutra leptonyx* of Horsfield, but has a shorter, deeper-brown fur, and diminutive toes. Dr. J. E. Gray has examined the skull, and pronounced it not to differ from that of a specimen from India, figured in P. Z. S. 1865, p. 130; and its external form, I find, agrees with that of skins of the short-toed race from Madras in the British Museum. Dr. Jerdon (Mamm. of India) does not separate the Indian *Aonyx* from that of Java; no more does Dr. J. E. Gray, though the latter considers *A. indigitata* (Hodgs.), of Nepaul, distinct. Unfortunately, there is no skull of the Nepaulese animal in the Museum; but the skin there has a similar foot to that of the Madras Otter above referred to, but differs in being paler with lighter underparts.

Short-toed Otter from Saigon, ♂. Length 26 inches; tail 9½ length of head 4, from ear to ear across head 3, eye (outer angle) to eye across head 1·1; fore leg (shoulder to tip of toes) 7·8, ulnar joint to tip of toes 4·25; hind leg 9, tibial joint to tip of toes 3·4; sole of fore foot 1·25, from sole to tip of fourth toe beyond ·4, breadth of sole ·75; length of hind sole 1·6, toes beyond ·5, breadth of hind sole ·65. Toes imperfectly webbed.

Lips, cheeks, sides of neck, throat, and face-bristles buff-white. The rest of the fur dark brown, paler on the underparts, and much so on the chest. Down short and close, yellowish or buff-white on the lighter parts, browner on the upper or darker parts. Pelage very short and glossy. Ears small and rounded, covered with short hair. Hair on fore feet extremely short, on tail short and close.

11. THE THIBETAN BLACK BEAR. *Ursus tibetanus* (F. Cuv.).

A large black shaggy skin was shown me in Hainan as having been taken from an animal in that island. I judged it to be of this species rather than of *Ursus malayanus*, Horsf. Bears are shot with poisoned arrows by the wild tribes of the mountains. The Hainan Gazetteer has the following passage:—"*Heung* [or Bear] is fond of climbing trees and panting. Its gall in spring is in its heel, in

summer in its belly, in autumn in its left paw, in winter in its right paw. About its heart there is a white fat like jade, the taste of which is extremely fine; this is usually called 'Bear's white.' In winter the Bear lies torpid and does not eat. When hungry it licks its own paws, and thence the goodness in the paws.

"The Gazetteer of Kiungchowfoo says that Hainan produces Pig-bears, Dog-bears, Horse-bears, and Man-bears, alike in the body but differing in the head. Horse-bears are very large. Man-bears are not often seen.

"The old authors say that the Bear has great strength and is given to devouring children. The Le men attack and capture them, a whole tribe uniting in the attack. Where Bears are plentiful the place has no peace. The gall-bladder is of a transparent colour, like rice-grains, and if stuck through with grass-stalks and put into water the best kinds will spin round quite fast. These are good for dissolving all poisons."

12. THE MUSK-RAT. *Sorex myosurus*, Pall.

The Musk-rat was common in the houses in the capital city, and I was often disturbed in my room at night by its clinking note. It is found in all the large towns in South China and Formosa, being transported about in junks with the cargo.

13. SWINHOE'S WHALE. *Balænoptera swinhoii*, J. E. Gray, P. Z. S. 1865, p. 725.

I had heard much of the Whale-fisheries in the Hainan seas, and was in hopes that we should see some of the operations in connexion with them; but the season had passed. We saw, however, one or two large Whales off the west coast of Hainan. We made inquiries about their bones at every fishing-port we touched at, but only succeeded in getting one rib, which is now in the British Museum. It was the only remnant of a Whale that had been captured by some fishermen on the west coast of Hainan. The oil of the animal had been melted down, the flesh eaten, and the rest of the bones chopped up for manure.

This large Chinese Rorqual appears to spend its winter in the seas about Hainan and in the Gulf of Tonquin. It must there produce its young; for in May it is seen with its calf in the Namoa Straits (near the port of Swatow), and remains in that neighbourhood and about the Formosan channel till the north-easters set in at the end of October, when it wends south-westwards again.

A good account of the pursuit and capture of this species is given in the 'Chinese Repository' of November 1843, Art. IV., "Notices of the Whale Fishery in the Chinese Seas, as conducted by the inhabitants of the coasts."

14. RED-BELLIED SQUIRREL. *Sciurus castaneiventris*, Gray, Cat. Mamm. Brit. Mus. 1843, p. 142.

S. erythræus, Pall.; Swinh. Mamm. of Formosa, P. Z. S. 1862, p. 11.

Length of body, from snout to root of tail, 7½ inches; length of

tail to tips of hairs at end 9 inches. Underside of legs, breast, and belly deep chestnut, in some rich and glossy, in others dull and inclined to maroon colour; the chestnut distinctly divided from the upper colour, and not blending with or shading into it. In some the chestnut extends to the throat, in others it is entirely wanting there; others, again, have it in greater or less extent. The amount of chestnut on the underparts also varies. In one of my specimens this colour springs from the pit of the arm and runs to the base of the thigh, thus ranging on either side of the underparts in two broad distinct lines; a second specimen has these lines blending across the belly. The hair of the upper parts is yellowish olive-grey, fretted with black, each hair being banded alternately with black and yellowish olive-grey, having the latter colour at the tip in the hair of the sides, but the black at the tip in the hair of the back. The long hairs of the tail are similarly, but more broadly, banded, the yellowish grey becoming nearly white towards the end of the tail, and the black conspicuous. The tail in all except one of my specimens is bushy. In this one the hairs are worn short, and the apical half of the tail has the appearance of being banded alternately with black and yellowish grey. Ears small and somewhat angular. Moustache-bristles black. Iris deep blackish brown. Toes blacker than the general colour. In the colouring of the upper parts some specimens are blacker and glossier, some greener in the olive tint, and some washed with chestnut-buff.

This Red-bellied Squirrel, which I first got in Formosa, I have since found in the Fokien mountains. In Hainan it was common about the gardens under the north wall of Kiungchow city; and I also met with it in almost every place that we visited, both in the interior and along the coast. In one place, on the 26th of March, I discovered its nest in a small tree near a village. It seemed in every respect like the nest of our Red Squirrel at home. It contained one half-grown young one, which jumped out and escaped.

The Gazetteer calls this Squirrel "The *Too-shoo* (or Poisonous Rat), of a size larger than a Rat, with a bushy tail. Bites the areca-nuts."

15. SMALL STRIPED SQUIRREL. *Sciurus m'clellandi*, Horsf.

Length of body 5¼ inches; tail to end of hairs 5½, Rat-like, with hair longer than on the body, an inch long at the tip. Upper fur and tail yellowish brown, lightly freckled with blackish, the black predominating on the tail. Back with a central black line extending from between the shoulders to the bend of the rump; on each side of it a light indistinct yellowish-brown stripe, followed laterally by one of chestnut-brown, then by one of light yellowish buff, and lastly by another of chestnut-brown. Ears small, angular, black on back, and tipped on the hind side of the apical angle with longish white hairs. Underparts dingy whitish buff, with smoke-grey bases to the hairs; the bases to the hairs of the upper parts much deeper grey. Some specimens are washed on the upper parts with chestnut, richly on the rump; others are blacker, with the dorsal stripes

blended. The amount of black on the tail also varies. The underparts of some are duskier, of others tinged with rose-colour, and of others, again, more decidedly buff.

Like the last, this little Striped Squirrel is found in Formosa, in the Tingchow mountains of Fokien, and in Hainan. In the latter island I first detected it in the forests of the interior; but I observed it later in most woody places, especially where the Areca- and Cocoa-nut occurred. It runs with great agility along the ground and up the trunks of trees, but it descends trees slowly and awkwardly. It is, however, quite an arboreal species. Dr. J. E. Gray considers the South China species the same as the Himalayan animal; so that it has rather an extended range.

The Gazetteer calls this the "Hill-rat, shaped like a Rat, but incapable of hurting rice."

16. COMMON RAT. *Mus decumanus*, Pall.

Common at Kiungchow city, and in all the large towns we visited. "*Shoo* [or Rat], of all hole-frequenting vermin the biggest thief. If it eats salt it gets light in body. If it eats arsenic it quickly dies. The skins of the larger ones are used for furs, which are called 'furs of the Heavenly Deer.'"—*Gazetteer.*

17. RED FIELD-MOUSE. *Mus badius*, Blyth?

I picked up near the capital city the mutilated body of a Field-mouse, with coarse yellowish chestnut hair above, and white beneath. The specimen was too bad to preserve. I refer it, with doubt, to Blyth's species from Burmah.

18. SUBCRESTED PORCUPINE. *Hystrix hodgsoni*, Gray, P. Z. S. 1847, p. 101.

One of our party picked up a Porcupine's quill in the jungle at Nychow (S. Hainan). It is black, with white at tip and base, and answers to the dorsal quills of the Chinese animal which I have brought home from the Fokien province (China), and which appears to be an adult of the Himalayan species, hitherto only known from immature crestless examples. The Chinese specimen shows a small crest on the back of the head.

The Chinese call the Porcupine the *Haochoo* (Bristly Pig) and *Fung-che*. The Hainan Gazetteer says it is "like a Dog, lives in holes in the ground; has the hair black and *sharp*, like awls, 4 or 5 inches long; and a large tail. When attacked, it shoots its thorny bristles at its aggressors."

19. THE HAINAN HARE. *Lepus hainanus*, sp. nov. (Plate XVIII.)

We did not meet the Hare at all in our rambles in Hainan; but a Mandarin's son in the capital city gave me a live specimen taken in the neighbourhood, which I was surprised to find very different from the small species (*L. sinensis* of Gray) that ranges from Canton to Peking. The Hainan Hare is of about the same size as the Chinese, but has a smaller and rounder head, is more brightly coloured and

differently marked, and, instead of having coarse hair, has a soft woolly fur more like that of *L. timidus*. Indeed it is strange that so warmly clad a species should be found in such low latitudes.

Back, shoulders, and rump light yellowish brown, tinged with chestnut and fretted with black, the individual hairs having a band of yellowish and a long tip of black. On the rump the long hairs are closer together, and the black unites to form irregular bands and streaks. Down at root of hairs brownish grey. Round the nose, forehead, between the ears, and cheeks the main colour as above, all fretted more or less with black, the black forming an irregular mark on the cheek in rear of the eye-line. Anterior edge of eyelids and a patch in front of it white. Ear in front brown, with a few of the hairs tipped with yellowish; behind pale buff, blackish brown at tip, with a white margin; front borders of ear white. Throat, breast, belly, under tail, and inner surface of hind legs pure white; inner surface of fore legs less distinctly so. Hind neck light rust-colour, with a broad line of a deeper and richer hue of the same down its centre, making together a conspicuous patch. A broad band of rusty yellowish brown runs across the under neck and chest, sprinkled with a few black hairs; fore legs a richer hue of the same inclining to tile-red. Hind legs brown. Sides of body light chestnut-brown with few black hairs. Soles of feet light dingy brown; nails brown. Tail brownish black on upper surface. Moustache-bristles, some black and some white, and some half and half.

In its coloration this species may be at once distinguished from *L. sinensis*, Gray, by its white throat and much whiter underparts, by its broad nuchal patch and black upper surface of tail, and by the white borders to its ears. The coarse hair on its soles is a dull tawny, and not the bright ferruginous that marks those parts in *L. sinensis*.

Total length about 14 inches; of tail to tip of hairs 3; of fore leg 4·75; of femur 3·75, of tibia to end of toes 3½; of ear 3; breadth of eye ·6.

Skull much shorter than a skull of *L. sinensis* of the same age, but of nearly equal breadth, rounding uniformly backwards, and the nasal bones sloping gradually forwards and downwards, giving the head a rounded appearance. Incisive opening above palate narrower at base. Posterior edge of palate with a rounded nasal spine, the same part being smoothly convex in *L. sinensis*. Occipital bone above the foramen magnum nearly flat, with but a slight central ridge. Supraorbital process small and placed back. Molars smaller and narrower, $\frac{5-5}{5-5}$. Anterior upper incisors without the deep groove which characterizes these teeth in the genus *Lepus*, but marked with several narrow indistinct ridges. Lower jaw short and high. Incisors $\frac{4}{2}$.

Dimensions.—Length from front of incisors to projection of occipital crest 2·85; breadth from molar to molar 1·45, between orbits ·62; from foremost molar to front of incisors ·85; greatest breadth of brain-case 1 inch; height of skull (crown to base of lower jaw) 1·80.

The peculiar form of the upper incisors in the Hainan Hare is worth

noticing. A skull of *L. ruficaudatus*, Geof., from India, in the Museum of the Royal College of Surgeons, has similar upper incisors.



Fig. 1. Skull of *Lepus hainanus*, from behind.
2. Ditto, from before.
3. Ditto, upper view.
4. Ditto, side view.

The nearest ally of our species appears to be *L. peguensis*, Blyth (J. A. S. xxiv. 471, and J. A. S. xxi. 359), "from the east side of the range of mountains dividing Arakan from the valley of the Irrawaddy," which, however, is a larger animal, has "the paws black underneath," "a large blackish terminal patch to the ear," and "towards the tail above a strong tinge of ash-colour." Blyth adds,

in a footnote to the second reference, "Hares are unknown in Arakan and in the Tenasserim provinces, also throughout the Malayan peninsula and archipelago, with the exception of *Lepus nigricollis*, F. Cuv., in Java, which has most probably been introduced from S. India or Ceylon, as it doubtless likewise has in the Mauritius; but we have met with several notices of Hares in the Indo-Chinese countries, even in Cochin-China, the species being as yet undetermined."

The Gazetteer says of the *Too* (or Hare), "In the Buddhist books it is called *Shay-kia*; is as large as a fox and of a brownish colour; its *anus* has nine apertures; the female gets impregnated by licking the bristles of the male."

20. WHITE-WHISKERED WILD BOAR. ?*Sus leucomystax*, Temm. et Schleg. Faun. Japon.

I heard of a Wild Hog occurring in the island, but never got sight of it. The Hainan Gazetteer speaks of it as if it were the ordinary Wild Boar, and merely quotes from the *Puntsao* (the great Chinese Herbal) the following remarks in illustration:—"*Yaychoo* (Wild Pig), Kow Tungshe says, is in form like the domestic Pig, but has a small belly, long feet, and brown hair; roams about in herds. The hunters dare only shoot arrows at the hindmost animal; if they hit the foremost, or one in the centre of the herd, the rest scatter and wound the sportsmen. The pork of the Wild Boar is red, like horse-flesh, but is more excellent eating than that of tame Pig."

Du Halde (*op. cit.*) tells of the "Cochons-marrons (which are a species of Wild Boar)" being very common there.

At Yu-lin-kan (S. Hainan) the Le people trap the Wild Pigs by clearing a space on the edge of the jungle and enclosing it with a wooden stockade, with an opening on one side. The stockade is angular; and at each angle is built a cone-shaped trap, formed of strips of wood, pointing outwards and downwards. The Pigs that venture inside the stockade are driven, and in their attempt to escape jump head foremost into these wooden pockets, and, not being able to back out of them in their hurry, are easily taken.

At the bartering-place Lingmun (Central Hainan) I picked out two Pigs' skulls from a lot of bones brought in by the Le to dispose of to the Chinese for manuring-purposes. These skulls are evidently not of a wild Pig.

Du Halde must mean by "Cochons-marrons" runaway, or feral, domestic pigs; but it is scarcely probable that a large island like Hainan has been stocked by runaway pigs. I did not see any peculiar Pig in the possession of the Le people, nor did I hear of any.

21. SCALY ANT-EATER. *Manis dalmanni*, Sundevall.

Pholidotus dalmanni, Gray, P. Z. S. 1865, p. 366.

I procured the skins of an adult and of a young Scaly Ant-eater at Hainan, which have much in common with the South-China species.

Adult. Total length 33 inches; tail 12·75 inches. Ears developed much as in the Chinese species. Scales rather darker. Reddish hair on underparts, and between scales much darker. Scales

of the three lowest series on sides of body between fore and hind legs carinated, or with a longitudinal ridge down the centre of each. A few on hind leg also keeled, but less distinctly.

Young. Total length 16 inches; tail nearly 6 inches. Scales very pale, whereas in the young of the Chinese species they are very dark. Lateral scales with prominent keels; those on hind leg more or less distinctly so. Scales small and uniform in adjustment, and with complete edges; those of the adult jagged, and broken at edge. Two small bundles of stiff hair project over each scale on the right and left of the overlapping apex of the scale behind.

I have a series of skins and bones of the *Manis* from Amoy and Formosa, which, together with the two above skins, I have handed over to Dr. Günther of the British Museum, who has offered to make a special study of them.

The Gazetteer gives, "The *Chuen-shan-kia* (or Hill-borer), also called *Ling-le* (or Mountain Carp), like a small Crocodile (Tow), and resembling a Carp with legs. Burrows in the hills, and enters into water. Delights in eating ants."

This closes the list of Hainan Mammals actually seen or procured in whole or part by myself. But to make the paper as complete as I can, I will quote the remaining matter in the Hainan Gazetteer on the subject, taking it in the order of the Chinese work.

"*Wild Cattle*.—These are domestic cattle that have for long had the run of the numerous mountains and peaks of the neighbouring Le. These have originated from cattle that were let loose to pasture and not collected to their stalls each night. Their dispositions have become wild, and they flee from the sight of man. To obtain them it is necessary to shoot them with a gun."

"*Seao kow, or Small Dog*."—The old edition of the Gazetteer does not describe it. Of the group classed under the character *Le* (or Fox) we are told there are "several kinds." Besides the Heangle (*Viverra zibetha*), the Mao-hwa-le (*Viverricula indica*), the Pe hia le and Chale (which I take to be *Helictis moschata* and the *Herpestes* respectively), it gives the Chih le, or Red Fox. Some of my companions declared they saw a Fox at Nychow; but when cross-examined they were not confident it was a genuine Fox. The Chinese term for *Vulpes* is Hoo le; and I do not think the writer would refer to the true Fox, which is a well-known animal in China, under any other name.

"Tsze-wei (or Hedgehog), shaped like a Rat, with the whole body covered with spines." I found a Hedgehog common in North China (Tientsin and Peking), but I have never seen it in the south.

"The Gold-cash Pao (or *Leopardus varius*, Gray)." See above, under *Felis macrocelis*.

"Chai, resembling a Dog (Kow) with a long tail. Lang, like a (Keuen) Dog, with pointed head and high cheek-bones." Both Chai and Lang are applied to Wolves in books; in speaking it is customary to couple them together. I take the first to imply a species of *Lupus*, and the other *Nyctereutes procyonides*, Gray; but it is very questionable whether either occurs in Hainan.

"*Cattle*.—There are two kinds, called Water-Cow and Yellow

Cow." The Water-Cow is the ordinary Chinese Buffalo, used for tillage and draught throughout the warmer parts of China. In Central Hainan (Taipingsze) nearly all I saw were *albinoes*—that is, had pink flesh, white hair, and red eyes.

The term Yellow Cow refers in South China to a small, short-horned, straight-backed breed, which used to occur wild in Formosa a century or two ago. I saw few of these, however, in Hainan. Most of the domestic cattle there were more or less humped, and seemed to be a cross between the Yellow Cow and the Indian humped breed. They were of much the same size as the Yellow Cow, but were in many cases brindled and patched like our home cattle. The South-China cattle are generally of a uniform yellowish-brown or black colour, sometimes with more or less white on the head, feet, and belly.

"*Horses*.—There are many white and sorrel-coloured. A work on geography of the former Han dynasty describes Tanurh and Choogai (divisions into which the Chinese possessions in Hainan were then divided) as having neither Tigers nor Horses. The old Gazetteer also says, 'Horses do not count among the natural productions of Hainan.' In the present day Tigers do not exist there, but Horses are produced in abundance." The said Horses are, of course, only Ponies of the small South China breed, with well moulded and compact limbs, rather large head, and long tail. They are not much used, except by officials.

"*Yang* (*or Goat*).—There are Hill-goats and Manure-goats. The former are driven out to pasture over the land and find their own food. The latter are shut up when small in floored and covered pens, and fed on cut grass and leaves. Their feet never touch the ground. They grow very fat and are excellent in flavour." All the Goats I saw pasturing on the hills were black, with yellow irides. Their hair was rather short and coarse, their horns about the length of the head; and they had the usual chin-tuft. It is the ordinary breed of South China and Formosa.

"Yu shoo, also called Sêng shoo, with a long body and large tail, is capable of suppressing Snakes and Vipers; is also fond of seizing Rats, birds, and poultry. In the work Kwang ya it is called Shoo-lang (Rat Wolf). The following verse from the Chuen-tsze refers to this creature:—'Can the Ke-ke (warrior's charger) catch Rats like the Leseng?'" This is the *Mustela sibirica*, Pallas. Where the House-rat is abundant in Chinese towns this Weasel is pretty sure to occur also. It is as common in Amoy as in Tientsin.

"*Kow* (*Dog*).—These are yellow, black, white, banded, all colours. Those that hang the feet with soles upturned are called Keuen. Those with long muzzles can be used for tilling the fields." The commonest Dog kept by the Chinese in Hainan is the one generally seen in South China, a larger breed of what is known as the "Wolf Dog" in England. There was another race, with shorter and blunter head, short hair usually of a brindled colour, of rather larger make, and bigger-boned. There were also what appeared to be Mongrels between these two. I have noticed the second race as also occurring

about the towns and villages of South China. The Aborigines appear to have no peculiar Dog of their own.

"*Choo* (*Pig*).—Ears small, hoofs short. The white-necked variety is looked on with dislike." These small white and pied Pigs are reared in great quantity in Hainan, and a large trade is done in them with Canton, where the larger black race of South China, with long head and drooping ears, hollow back, and hanging belly, is comparatively scarce. It is the Hainan Pig that has been introduced into England, through Canton, as the "small China Pig;" and there is certainly a strong family likeness between the pretty Hainan race and the Berkshire breed at home.

"*Mao* (*or Domestic Cat*).—Cannot endure fleas or lice on its skin. Cats that have nine holes inside the mouth will catch Rats the four seasons through." The Cats that I saw in the towns of Hainan were of the small short-haired race reared in Canton and throughout Southern China—very similar to the ordinary London Cat, but rather smaller.

3. List of Reptiles and Batrachians collected in the Island of Hainan (China), with Notes. By ROBERT SWINHOE, F.Z.S.

I. *Sauria.*

1. VARANUS DRACÆNA (L.); Günther, Reptiles of Brit. Ind. p. 65.

This large Lizard appears to be common in the interior of Hainan, and is eaten by the Chinese. I procured the skin of a good-sized specimen, and the foot of a smaller one. Dr. Günther has determined them to be of this species, which before was only known to occur in India, from Nepaul to Ceylon. I have not met with it in any other part of China.

2. MABOUIA CHINENSIS (Gray); Günth. *op. cit.* p. 83.

The Chinese Skink is common in Hainan, and in China generally south of the Yangtsze. It is also abundant in Formosa, and in the dry sandy millet-fields of the Pescadore Islands, where, however, it seems always to remain of a small size. The large Chinese specimens are sometimes richly marked with orange on the sides of the neck.

3. PERIPIA PERONII (Dum. et Bibr.); Günth. *op. cit.* p. 110.

The noisy House-gecko, *Gecko japonicus* (Dum. et Bibr.), did not enliven the walls of houses in Kiungchow city; but in its place this small species was occasionally seen. It seems to be silent. The best specimen I have brought was captured on the wall of the Taotai's waiting-hall at night. It was catching the flies attracted by the light of a lamp. Dr. Günther quotes this species as occurring in Mauritius, Penang, and Ceylon; but this is its first occurrence within Chinese bounds.

4. Draco, sp.?

The little Flying Lizard appears only to be found in the jungly district of Nychow (South Hainan), where it is an article of trade. The natives say that it is usually met with during spring in the forests in pairs flying from tree to tree. They are caught with a net; and when one is taken the other falls to the ground and allows itself to be captured without difficulty. They are pinned out like Butterflies and dried for the market. Their chief use is to hasten childbirth, the dried reptile being placed on the forehead of the woman in labour. They are called *Fei-shay*, or "Flying Snake," and sell for one shilling apiece. I bought six of the prepared specimens; but Dr. Günther says that in their dried state it is impossible to determine the species.

5. Calotes versicolor (Daud.); Günth. *op. cit.* p. 140.

This long-tailed green Tree-lizard, with a combed back, was very common in all the woody parts of the island, and I secured a good series. It is very agile in its movements, running with great celerity along the ground and up trees, and leaping from bough to bough like a Squirrel. The Chinese are very loth to touch it, declaring it to be venomous.

6. Liolepis guttatus, Cuv.; Günth. *op. cit.* p. 154.

On the low sandy hill, partly covered with Cocoa-nut trees, that bounds on the south the Lingshuy lagoon (S. E. Hainan) I first met with this large, showy, white-spotted Lizard. They were very numerous, and the sandy soil was riddled with their holes. They lay basking in the sun, and when disturbed would run with great speed to the mouths of their holes, where they would stop short and turn their heads about. If not satisfied with what they saw, they popped at once into their holes. If surprised far from their holes, they spring into the air while running, and, expanding the loose red skin of their sides, skim along the surface of the sand for a considerable distance (say, often twenty yards at a time) and thus reach their retreats at greater speed. Their flight is not continued by flaps, but seems to be merely a long sustained leap, the body being made buoyant by the expanded side skin, and is analogous to the flight of the Flying-fish. They have a peculiar smell about them, which affects the taste of their flesh; and they are in consequence not eaten by the Chinese, except when in great distress for food. I met them again in the Nychow district, and in many warm sandy nooks along the west coast—never in the neighbourhood of woods, and I do not believe that they ever scale trees. We saw hundreds of them, and took great interest in watching their habits.

The British Museum has specimens of this Lizard from the Malayan peninsula, from Mergui, from Cambodia, and from China.

II. *Ophidia*.

7. Simotes or Oligodon, sp.?

A red Snake about 1½ foot in length, Dr. Günther says, belongs

to one or the other of these genera, but its head is so injured that he cannot determine it.

8. TROPIDONOTUS STOLATUS (L.); Günth. *op. cit.* p. 266.

This common Indian species, which may be distinguished by the longitudinal white stripe it carries on each side of its back, was abundant in Hainan, as it is elsewhere in South China.

9. PYTHON MOLURUS (L.); Günth. *op. cit.* p. 331.

Two large Pythons were exposed in the market for sale at Taipingsze (Central Hainan) in February. They had been taken in the neighbourhood, and I was told that the country people often brought them in. They were confined merely by a straw rope twisted round the neck. The natives declare that they are not hurtful to man; and are easily caught by throwing over their heads a noose of twisted grass, and may with this be led about without danger. They call them Vang, and take them for the sake of their skin, heart, and liver. The skin is used chiefly for making drums, banjos, and other musical instruments; and the heart and liver, when dried and pounded, for stimulative medicine. They offered the live ones to me for 1200 copper cash (5*s.*) each, provided I would return to them the hearts and livers. This was the day after the market-day, when the countrymen had left, and I could get no one to slaughter the monsters; so I contented myself with the couple of flat skins that I had already purchased at the bartering-station further among the mountains, which were quite sufficient to show the species.

Du Halde, in his great work on China, says of Hainan, "The reptiles cannot be dangerous there, seeing the confidence with which the islanders walk day and night on the plains and in the middle of the thick wood, without arms and with nearly always naked feet. There are, however, Snakes and Vipers of a prodigious size; but as they are very timid, a simple movement or the least cry drives them to a distance."

III. *Batrachia.*

10. RANA ESCULENTA, L.; Günth. *op. cit.* p. 408.

Very common about the rice-fields, and offered in most of the Hainan markets as an article of food. I did not preserve specimens.

11. RANA GRACILIS, Wiegm.; Günth. *op. cit.* p. 409.

A common species in Hainan, and, indeed, all over South China. Found on marshy ground and about the edges of rice-fields.

12. HYLA CHINENSIS, Günth. *op. cit.* p. 409.

Occurs in the woods of the island. It is generally observed sitting motionless on a leaf, and, from its green colour, often escapes detection.

In conclusion, I have to record my thanks to Dr. Günther for examining and determining all the species named in this list.

4. Descriptions of some new Genera and Species of Birds belonging to the Families Formicariidæ, Pachycephalidæ, and Sylviidæ. By D. G. Elliot, F.L.S., F.Z.S., &c.

(Plates XIX., XX.)

Clytorhynchus pachycephaloïdes, sp. et gen. nov. (Plate XIX.)

Clytorhynchus *genus novum* Pachycephalinarum; *rostrum compressum, subdescendens, ad apicem incurvum; gonys recurvus, fortiter ascendens; remiges secundus, tertius et quartus fere æquales et longissimi.*

♂. *Ex toto brunneus; subtus pallidior vix rufescenti-viridis: rectricibus apice albis; rostro et pedibus plumbeis.*

Hab. New Caledonia.

Upper parts dark rufous-brown, slightly brighter upon the fore part of head and rump. Primaries brownish black; secondaries and tertials like the back, with the edges of the outer webs reddish. Four central feathers of the tail blackish brown for their entire length, the remainder lighter brown, with the ends white, most extensive on the first and second, where it includes both webs, and is about half an inch in length, becoming much less on the third, and is represented on the fourth only by a round spot on the tip of the inner web. Underparts light rufous-brown, slightly darker on the flanks. Bill strong; upper mandible slightly hooked, lower with a decided upward curve, lead-colour at base; the cutting-edges of both mandibles and point horn-colour. Feet lead-colour, claws horn-colour.

Total length 6½ inches; wing 3½, tail 3, tarsus ¾, bill at gape ⅞.

This curious species, which represents an entirely new genus of the family Pachycephalidæ, holds the same relative position to this family as the *Vanga xenopirostris* of La Fresnaye (*Xenopirostris la fresnayus*, Bon.) does to that of the Laniidæ. It is a native of New Caledonia; and the unique specimen from which my description was taken is now contained in the collection of the Museum of Natural History of New York.

Clytoctantes alixii, sp. et gen. nov. (Plate XX.)

Clytoctantes *genus novum* Thamnophilinarum; *rostrum magnum, compressum, subrecurvatum; culmen rectum, apex non incurvus; gonys recurvus, fortiter ascendens; remiges quartus, quintus, sextus et septimus fere æquales et longissimi; pedes graciles, ungues longiores quam in genere* Neoctantes.

♂. *Capite et gula nigris, dorso abdomineque plumbeis; alis fuscescentibus; cauda brunneo-nigra; macula magna interscapulari alba; rostro nigro, mandibula inferiore ad basin albicante; pedibus nigris.*

♂ juv. *Niger, rufo-brunneo tinctus; capite saturatius rufo; regione parotica castanea.*

Hab. Rio Napo.



J. G. Keulemans, lith.

M. & J. Jongman, imp.

CLYTORHYNCHUS PACHYCEPHALOIDES.



J.C. Keulemans lith.

CINCLOSOMA ALIXII

♂. Upper part of head blackish; throat, ear-coverts, and upper part of breast intensely black. Back and lower part of breast very dark slate-colour, almost black. Tail brownish black. A concealed white spot in the centre of the back. The feathers of the rump very long and soft. Primaries blackish brown; secondaries lighter brown. Bill large, very straight on the culmen, black on the upper mandible; under mandible with a very strong upward curve, commencing at the base, and, in the specimen, extending beyond and above the point of the upper mandible, dark lead-colour. The form of the lower mandible in this specimen is probably abnormal, as it shows no indication of protruding in the bill of the young male before me. Legs and feet black; claws very long and slender, black.

Total length 6½ inches; wing 3¼, tail 2¾, bill at gape 1, tarsus 1½.

A young male, just commencing to throw off the colours of the female has the head and upper of neck and throat rich chestnut-brown interspersed with the black feathers of the adult. Back and underparts lead-colour, the tips of the feathers reddish brown. Tail black. Bill like the male, but slightly broader, the under mandible not extending beyond the upper. Feet and tarsus black, claws long and slender.

Total length 6 inches; wing 3, tail 2¾, bill at gape 1, tarsus 1½.

Hab. Rio Napo.

This extraordinary form of Formicariidæ is apparently an exaggeration of Mr. Sclater's genus *Neoctantes**, to which it seems to be nearest allied. In many respects resembling the members of the genus *Thamnophilus*, it yet differs greatly from them in the form of the bill, and shape and size of the feet and claws. In appearance it resembles *Neoctantes niger*, but is more of a plumbeous colour than that species; and the bill is larger, straighter upon the culmen, and the under mandible more decidedly and abruptly curved upward. The feet are larger, and the claws much longer and more curved.

I have named the species after Dr. Alix, of Paris, well known for various scientific publications.

The examples from which my description was taken are contained in the fine collection of the Museum of Natural History of New York.

CALAMOHERPE SUBFLAVESCENS.

Olivaceo-brunneus: subtus flavescens; linea superciliari flava; hypochondriis et pectore superiore olivascentibus; tectricibus alarum et remigibus brunneis; mandibula flava, maxilla brunnea.

Hab. Dahouria.

Entire upper parts olive-brown; a line over the eye yellow; underparts yellow, brown upon the flanks. Wings and tail dark olive-brown. Lower mandible yellow; upper dark brown. Tarsi and feet flesh-colour.

Total length 6½ inches; wings 3, tail 3, tarsus 1, bill .6/10.

This bird, which is apparently undescribed, comes from Dahouria,

* Described P. Z. S. 1868, p. 572.

in Central Asia, and was received in a collection of other species by Madame Verdey. It seems closest allied to the *C. fumigata* of Swinhoe from China, but differs from it in the following characters, which readily serve to distinguish it from that species. The upper plumage of *C. fumigata* is chestnut-brown, instead of olive-brown as in the present bird, which has no trace of chestnut; the superciliary stripe in *C. fumigata* is white, in this species it is yellow; the throat and underparts of *C. subflavescens* are yellow, while those of its ally are white. These are sufficient to indicate the differences which exist, although others occur*.

The specimen described is the only one I have seen; and I have no information regarding the economy or habits of the species.

5. On some new or little-known points in the Economy of the Common Swallow (*Hirundo rustica*). By R. B. Sharpe, F.L.S. &c., and H. E. Dresser, F.Z.S. &c.

In examining a large series of the Common Swallow (*Hirundo rustica*) for our proposed work on the Birds of Europe, some peculiar facts have come under our observation, which do not seem to have been previously recorded by other ornithologists; and we therefore lose no time in bringing them before the notice of the public. In order to place the result of our observations in as clear and concise a manner as possible before our readers, we think it best to give the following diagnoses of the specimens on which our conclusions have been based. We take this opportunity of returning our best thanks to Mr. Frederick R. Surtees, to whom we are indebted for the specimens from South Africa, which have been the means of our making the discovery of the curious phases of plumage through which the Common Swallow passes on leaving northern latitudes. The Rev. Dr. Tristram has also, with his usual kindness, sent us his specimens of Swallows collected by him in Palestine.

No. 1. (*Taken from a nest at Highgate, near London, on the 22nd of June*, 1869.) Frontlet (extending backwards over the eye) and throat very pale sienna; space between the bill and the eye, as well as the cheeks, black; entire upper surface dusky steel-blue; quills blackish, edged externally with greenish blue, as also the tail, which is almost square, the spots on the latter white, tinged faintly with buff; a band extending across the lower part of the throat and chest dusky black with scarcely any blue reflection; rest of the under surface of the body white, tinged with delicate buff, flanks dusky; bill blackish, yellow along the gape; feet dark brown. Total length 4·3 inches; wing 3·1; tail measured to tip of outer-feather 1·3.

* Since writing the above I have been shown by Lord Walden a specimen of *C. fasciolata*, Gray (P. Z. S. 1860, p. 349), from Batchian, which resembles my bird still more closely than *C. fumigata*, but differs in having a much larger bill and in the colour of the upper parts and tail. The two species can readily be distinguished from each other.

No. 2. (*Young, shot near Chichester by R. B. Sharpe on the 23rd of August*, 1869.) Above dusky steel-blue; forehead and eyebrow very pale sienna; least wing-coverts narrowly margined with pale sienna, as also are some of the inner greater wing-coverts; tail forked, the spots tinged with buff towards the shaft; throat pale sienna; band across the breast narrow, very dusky and mixed with sienna, which latter colour is very prominent on some of the feathers; under surface of the body pale buff, flanks a little dusky. Total length 6·2 inches; wing 4·8; tail, measured to tip of outer feather, 2·6.

Another young bird, caught at Highgate on the 24th of September, 1869, differs in having the underparts a little less buff, the throat and frontlet deeper sienna.

No. 3. (*Obtained in the Cape Colony by Mr. F. R. Surtees, and given to us by him; mus. R. B. S.*) Upper surface dusky brown, especially on the head, washed sparingly with steel-blue; quills and tail dusky brown with scarcely any greenish reflection, shafts dirty brownish white; the form of the frontlet marked with pale whitish feathers extending backwards above the eye; throat quite white, with a tinge of rufous, apparently the remains of a red feather, on a few of the feathers on the sides of the neck; below the white throat a band of dusky-brown feathers rather broad and mixed with a few pale rusty-coloured feathers in the centre; rest of the under surface of the body white, with just a tinge of buff on the lower part of the belly. Total length 6·2 inches; wing 4·7; tail, measured as before, 2·65. This bird is probably a late-bred bird; his plumage is thoroughly bleached. He is just beginning to moult and put on his spring plumage; but no signs are apparent of the new feathers on the head and throat, the new feathers having a dark shaft.

No. 4. (*In changing plumage, from the Cape, also obtained by Mr. Surtees.*) Above deep steel-blue, except the head, which is dusky brown, with a cluster of small blue feathers on the nape and sides of the head, and a few scattered over the crown; forehead only indicated by a fulvous mark, as in the preceding bird; cheeks brown, just slightly washed with blue; quills blackish brown distinctly washed with bright greenish steel-blue, the first primaries worn and dull brown with light brown shafts (N.B. These have not been shed, while the other quills are lately donned); tail-feathers blackish brown washed with greenish steel-blue, the spots pure white without a tinge of buff; one outer feather lately put on and having a dark shaft, all the shafts of the others being light brown; chin white with a few red feathers here and there, rest of the throat chestnut; a rather narrow breast-band, dark brown, becoming distinctly glossed with bright steel-blue, a few reddish feathers coming in the centre; rest of the under surface of the body pure white with a suffusion of buff, deepest on the under wing- and tail-coverts. Total length 6·6 inches; wing 4·6; tail, as before, 3·1.

No. 5. (*Also obtained by Mr. Surtees; mus. H. E. D.*) Similar to the foregoing, but shows the coming rufous forehead, distinctly indicated by a frontlet of pale sienna, the upper surface brilliant

steel-blue, but the head all brown, except a few blue feathers coming on the side; first primaries unmoulted, as also are some of the secondaries and tail-feathers; the throat almost entirely rufous, except the chin, which still remains somewhat whitish; breast-band becoming distinct, a few rufous feathers intermixed, washed with deep steel-blue; rest of the under surface of the body deep buff, especially on the under wing- and tail-coverts, which are almost chestnut. The quills and tail are too much abraded to give satisfactory measurements.

No. 6. (*Male, shot at the Knysna by the late Mr. C. J. Anderson on the 2nd of January*, 1866; *mus. R. B. S.*) Apparently a bird of the previous year putting on its full spring plumage, as it has a trace of the swollen yellow skin at the gape; upper plumage very bright steel-blue, and the red forehead well marked; no trace of white on the throat, and the breast-band dark steel-blue with red feathers intermixed; under surface of the body rich buff, especially dark on the under wing- and tail-coverts; the quills and tail abraded and not thoroughly moulted, though the new feathers are coming rapidly.

No. 7. (*Sent from the Cape Colony by Mr. E. L. Layard; mus. R. B. S.*) Apparently about the same age as the last specimen, but the head brownish, only just beginning to assume the steel-blue appearance, the rest of the upper surface very bright steel-blue; frontlet distinctly marked but very narrow; throat and breast-band as in the last specimen, but the under surface of the body white, with a faint buff tinge on the under wing- and tail-coverts; quills and tail only partially moulted, much worn.

Nos. 8 and 9. (*Male and female, shot at Cookham, in Berkshire, by Mr. J. Ford, on the 19th of April*, 1869; *mus. R. B. S.*) Above most brilliant steel-blue; quills and tail washed with greenish steel-blue; forehead and throat deep chestnut; band on the breast steel-blue; under surface deep buff, particularly on the under wing- and tail-coverts. Total length 8 inches; wing 5·1; tail to tip of outer feather 4·5. The female is somewhat smaller, the frontlet and throat not quite so deep, the belly white, and the tail shorter, with the spots on the latter smaller. Total length 7 inches; wing 4·9; tail 3·7.

No. 10. (*Female, fully moulted, obtained in Natal by Mr. Ayres; mus. H. B. Tristram.*) Similar to No. 9 (♀), excepting that the head is duller, the feathers of the crown being slightly intermixed with brown, and the frontlet and throat not of such a deep rufous colour.

No. 11. (*Male, shot at Tiberias on the 27th of February*, 1864, *by Mr. Tristram.*) Differs in no way whatsoever from No. 8 (♂).

From the examination of these specimens the following conclusions are derived; and we earnestly beg our ornithological readers to assist us in the further elucidation of this most complicated question; but we must remark that it will be necessary to have a large series of carefully authenticated specimens before the subject can be approached. We have at the present moment a series of forty-five skins lying before us from all portions of the globe where *Hirundo rustica* is found.

Remarks.

1. The Common Swallow on leaving the nest has a pale sienna frontlet and throat, the upper plumage very dull, and the entire breast suffused with pale buff; the band on the chest very dusky, but large for the size of the bird. This plumage slightly intensifies as the bird gets older; and on leaving this country the chest-band is more distinct, the upper plumage more suffused with blue, and the throat and frontlet of a darker tinge; the outer tail-feathers and primaries also become more elongated (*cf.* descriptions of spec. 1 and 2, *suprà*, pp. 244, 245).

2. When the young bird arrives in Southern Africa its plumage has undergone a complete change, which may be called the winter plumage of the bird of the year (*cf.* description of spec. 3, *suprà*, p. 245); the throat is white with the very faintest tinge of rufous, abdomen white, breast-band broad, but pale brown, the upper surface dusky brown washed with blue, and the entire head brown, with very slight blue reflections.

There is no doubt that this stage of dress is arrived at by the gradual bleaching of the young feathers, and the full plumage is regained *by an entire moult*. This is shown especially by the quills, those of the old plumage being worn and pale in colour, the shafts being nearly white, whereas the new feathers, some of which, in our specimens above mentioned, are always to be found alongside of the old quills, have black shafts. The long primaries are the last to be shed.

3. The adult specimens of *Hirundo rustica*, which pass the winter in Southern Africa, have the breast white; and as the period of the migration northward approaches, this becomes suffused with buff, and is very distinct when the bird begins its northward journey. On arriving in Europe both sexes (?), the male certainly, have the breast and, particularly, the under tail-coverts buff, the frontlet and throat rich chestnut, the breast-band and upper surface much more brilliant blue than when it leaves the Cape. In the male the buff continues during the summer, getting paler towards the autumn; but the breeding female is always pure white underneath.

4. We may here call attention to the curious fact that though the young on leaving the nest has a frontlet of pale sienna, so complete is the process of bleaching through which the bird passes before reaching the Cape that on its arrival there all traces of the rufous frontlet have disappeared, and there is a mere indication of a frontlet by the presence of a few pale buff-coloured feathers. At the spring moult the red forehead is resumed.

Before concluding the present essay we have a few words to add respecting the supposed variety of the Common Swallow to which the name of *Hirundo riocouri* has been given. We have examined several carefully authenticated specimens of this bird; and we fully believe it to be a distinct species, possessing a very limited range. Indeed we do not hesitate to say that its occurrence in Europe is very doubtful, and that its admission into the European avifauna

has yet to be thoroughly confirmed. The statements of Professor Blasius, which are reproduced in Dr. Bree's 'Birds of Europe' (vol. iii. p. 171), need confirmation as to its interbreeding with the Common Swallow and being generally found in Europe; for we have every reason to believe that the adult spring plumage of *H. rustica*, when the under surface is deeply suffused with buff, has been mistaken for *H. riocouri*. The latter bird may always be distinguished from the Common Swallow by the uniform chestnut tint of the whole under surface below the chest-band, and also by the spots on the tail being of a pale rufous colour and not white. The range of the *H. riocouri* is limited to Palestine and Egypt, extending not further south than Nubia; and in these countries it is not migratory. In confirmation of the above remarks we may quote from the writings of Dr. von Heuglin (Orn. N. O. Afr. p. 152) and Dr. Tristram (Ibis, 1867, p. 361).

"*Hirundo cahirica*," writes the former author, "in mode of nidification and song, as far as I know, hardly differs from *H. rustica*; but it is a resident in Egypt, though not so further south*. It breeds in the months of January to April. In Arabia I have observed the true *H. rustica*, but not in the bright-breasted plumage, which latter, however, I have never found in the breeding-season in company with *H. cahirica*."

We also add his remarks on *H. rustica* (Orn. N. O. Afr. p. 151). "In the beginning of March to early in May, and between August and October, this bird is frequently seen in companies on the migration, often mixing with other species along the Nile and the Red Sea, and even on the true steppes. On the 15th of November, 1857, I even observed on the Somali coast a flight of migrating Chimney-Swallows, and believe that they extend their migrations far to the south of the equator, according to Ayres to Natal. Amongst the Chimney-Swallows which are found during the summer on the Red Sea I have never observed *H. cahirica*."

Dr. Tristram says (*l. c.*)—"*Hirundo cahirica* remains the whole year, and is found both on the coast (in the maritime plains) and throughout the length of the Jordan valley. No one can observe this bird in the Holy Land without being satisfied of its distinctness from *Hirundo rustica*. It is true we can give no other diagnosis than the difference of coloration on the lower parts, these being chestnut instead of white or brownish white; but of the hundreds of Swallows of both sexes to be seen throughout the winter not one of the common sort could be detected. There is neither fading nor intensifying of the chestnut lower plumage at any time of the year. Specimens shot at all seasons are precisely similar. In spring their numbers rapidly increase; and from the middle of March they become distributed over the whole country, the higher as well as the lower grounds, while along with them appear many of our common species. In the higher grounds these perhaps predominate; in the lower certainly the *Hirundo cahirica* is most numerous. I never could detect

* A specimen from Nubia, collected by Rüppell, is in the Leyden Museum.—R. B. S.

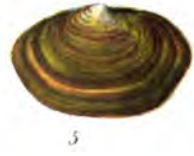








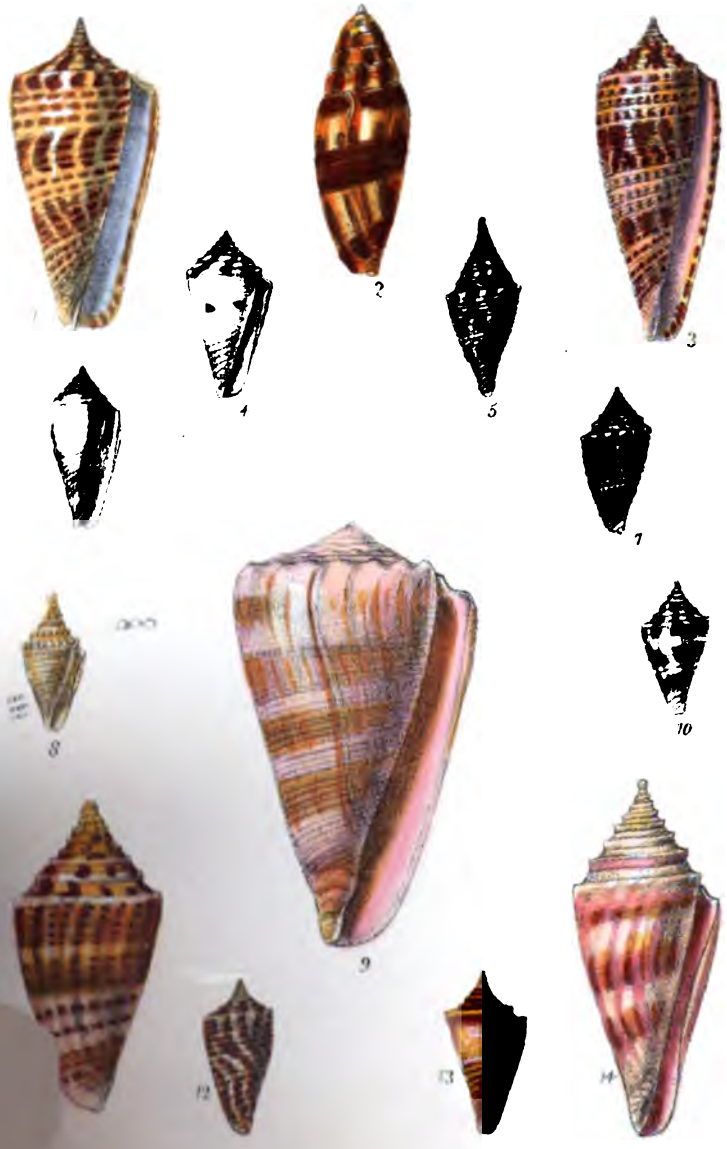




G. B. Sowerby Lith.

M & N Hanhart imp.

NEW SHELLS.



M. & N. Hanhart imp.

NEW SHELLS

the two sorts interbreeding, though the nest and eggs are precisely similar."

In conclusion we beg to state that we by no means wish positively to deny the occurrence of the true *H. cahirica* in Europe. On the contrary we believe it very possibly does occur within European limits; but at the same time all the so-called European specimens of *H. cahirica* that we have seen have been *H. rustica* in spring dress. We shall be most glad to receive any authentic specimens of *H. cahirica* from any part of Europe, that we may be certain on the subject before including it in our 'Birds of Europe.'

6. Descriptions of Forty-eight new Species of Shells.

By G. B. SOWERBY, F.L.S.

(Plates XXI., XXII.)

CRASSATELLA SUBQUADRATA.

C. *testa oblongo-subquadrata, valde compressa, solida, pallide rubescente, castaneo obscure radiata, ad umbones purpureo biradiata, intus albida, extus concentrice minute striata, liris angulatis subdistantibus, ad angulum quadratis sculpta; latere postico longiusculo, obtuse angulato, post angulum complanato, margine dorsali recto, subdeclivi; latere antico breviusculo; margine dorsali utrinque concavo-complanato; margine interno lævi.*

Hab. Agulhas Bank, S. Africa.

Mus. Taylor.

CRASSATELLA FOVEOLATA.

C. *testa obliqua, crassa, tumida, rostrata, pallida, castaneo maculata, intus partim castanea, extus costellis validis rotundis subdistantibus medio tumidiusculis concentricis lirata, interstitiis profundis; latere postico oblique producto, elevatim angulato, eleganter rostrato, post angulum castaneo; umbonibus elevatis, prominentibus, acutis, margine dorsali utrinque declivi, excavato; margine interno denticulato; epidermide fusca.*

Hab. China Seas.

Mus. Taylor.

This shell resembles *C. sulcata*, but differs from it in being more pointedly beaked and more distantly and deeply grooved. All the ridges in this species follow the lines of growth; but in *C. sulcata* they become excentric towards the margin.

CRASSATELLA CREBRILIRATA.

C. *testa ponderosa, obliqua, subcompressa, pallide fulvescente, obscurissime radiata, umbones versus rubescente, intus pallidissime rosacea; latere postico oblique producto, angulato, post angulum complanato, margine terminali oblique truncato; latere antico*

brevissimo, margine dorsali utrinque valde declivi excavato; margine interno obscurissime denticulato.

Hab. Agulhas Bank, S. Africa. 15 fathoms.

Mus. Taylor.

SOLENELLA SUBÆQUALIS. (Pl. XXI. fig. 5.)

S. *testa subovata, subæquilaterali, tumidiuscula, breviuscula, latere postico lato, obsolete biangulato, inter angulos radiatim subdepresso, margine dorsali rectiusculo, margine ventrali abrupte sursum acclivi; latere antico angustiusculo obtuso, margine dorsali subdeclivi, margine ventrali abrupte sursum acclivi.*

Hab. Rio Janeiro.

Mus. Leckenby.

This third species of its genus is intermediate between the former two in its lateral proportions. In *S. norrissii* the anterior is much the shorter side; in *S. cumingii* the posterior is the shorter. The present species is equilateral.

LEDA IRRADIATA.

L. *testa parva, ovata, radiatim nitente, minute concentrice lirata, tumida, subæquilaterali; latere postico subacuminato, versus terminum radiatim vix depresso; latere antico acuminato, ad terminum arcuatim elevato; lunula lata.*

Hab. China Seas.

Mus. Taylor.

A pretty little species, showing a brilliant irradiation resembling that of the cat's-eye jewel.

DOLABRIFERA BRAZIERI.

D. *testa recta, planiuscula; apice elevato, recto, crasso, intus rotundato, convexo, extus concavo; margine postico declivi, concavo, margine labiali rectiusculo, antice incurvo, sinuato; margine sinistrali rectiusculo.*

Hab. Northhead, Botany Bay (*Mr. Brazier*).

Only two specimens of this, the first species of the genus found on the south-west coast of Australia, were taken by Mr. John Brazier. No note seems to have been made of the character of the animal; but the shell, which is large, differs from that of other known species.

HELICINA MANGOENSIS.

H. *testa pallide lutea, supra aurantia, trochæformi; anfractibus convexis, infra medium carinatis, supra carinam spiraliter liratis, infra carinam subplanulatis, læviusculis; carina lata, declivi, subtus vix crenulata; apice obtuso; apertura trigona; margine basali convexiusculo.*

Hab. Mango Island, Fijis (*Mr. Brazier*).

Unfortunately only one specimen of this remarkable *Helicina* has been taken. It is similar to *H. josephinæ*, but much more convex above.

AMATHINA TRIGONA.

A. *testa parva, solida, superne complanata, medio carinis duabus distantibus divergentibus, et infra medium costellis tribus spiraliter radiata, infra costas planata; apice parvo, acuminato; apertura magna, trigona; margine basali declivi, oblique producto.*

Hab. Tongataboo, Friendly Islands (*Mr. Brazier*).

This new *Amathina* has two widely diverging principal keels or ribs, above which is a broadly flattened, depressed area, and below which are several small ribs and a plain space.

ELENCHUS DILATATUS.

E. *testa brevi, subcinerea, spiraliter subdistanter lirata; spira brevi; anfractibus quatuor, ultimo lato; apertura dilatata, viridi-cæruleo iridescente.*

Hab. New Zealand (*Mr. Brazier*).

Remarkable for the expansion of the last whorl.

SOLARIELLA UNDATA.

S. *testa subdepressa, umbilico rotundo usque ad apicem perforata, margaritacea, pallide rubescente, spiraliter tenuiter lirata, supra prope suturam angulata; medio anfractuum carina rotundato-angulata, angulis distanter rubro maculatis; interstitiis rubro undato-lineatis.*

Hab. Agulhas Bank, S. Africa.

Mus. Taylor.

CYLLENE RUBRO-LINEATA.

C. *testa ovato-acuminata, albido-fulvescente, ad dorsum pallide purpurea; spira breviuscula, acuminata; anfractibus numerosis, longitudinaliter oblique liratis; apertura longitudine spiram superante, intus castanea, labio columellari late reflexo linea rubra circumscripto; labio externo intus striato, extus post marginem incrassato; sinu antico parvo.*

Hab. ——?

Mus. Taylor.

TYPHIS DUPLICATUS. (Plate XXI. fig. 1.)

T. testa ovato-acuminata, inter varices castanea, varicibus arcuatim recurvis cum tubis interstitialibus junctis, tubas latas complanatas duplicatas efformantibus; spira acuminata; apertura subrotunda; canali elongato, clauso.

Hab. China Seas.

A second example of the peculiar form first presented by *T. arcuatus*, Hind., in which the varix is bent back towards the interstitial tube so as to form a double varix with a single opening. In the present case the union is less complete, and the opening part of the tube is broad, flattened, and contracted in the middle, so as to appear duplicate.

RAPA BULBIFORMIS.

R. *subglobosa, albido-subviridi, infra spiraliter imbricato-lirata; spira producta; anfractibus* 6, *rotundis; apertura pyriformi, angustiuscula; labio infra crenulato.*

Hab. Tongataboo, Friendly Islands.

This shell was found by Mr. Brazier in a large hole in a coral-reef, on a piece of sponge, in five-feet water. It has a much more produced spire than the known species, with rounded whorls.

FUSUS RUBRO-LINEATUS.

F. *testa breviuscula, pallide rubescente, castaneo bifasciata, distanter spiraliter rubro lineata, tenuiter striata; spira breviuscula; anfractibus septem, costis longitudinalibus subdistantibus rotundis spiraliter liratis ornatis, superne fascia castanea lata cinctis; apertura subovata, in canalem subelongatum terminante.*

Hab. Agulhas Bank, S. Africa.

Mus. Taylor.

TEREBRA TENUISCULPTA.

T. *testa angustissima, elongata, fusca, saturatiore flammulata, vel albida castaneo pallide flammulata; anfractibus compressis, supra prope suturam liris spiralibus inæqualibus prominentibus granoso-moniliformibus cinctis, infra cancellatis, ultimo infra angulum tenuiter sculptis.*

Hab. China Seas.

Mus. Leckenby.

EBURNA PERFORATA. (Plate XXI. fig. 2.)

E. *testa rotundato-pyramidata, maculis magnis fulvidis undatis, medio anfractuum truncatis, infra medium in series duas dispositis, subrotundis, brevibus picta; spira breviuscula, apice purpureo; anfractibus breviusculis, rotundis; canali suturali lato, profunde, excavato; umbilico latissimo, usque ad apicem spiraliter excavato, medio spiraliter calloso; apertura parva; labio columellari leviter arcuato.*

The deep, wide canal and short rounded whorls, an arrangement of spots differing from all the other species', and a spiral groove at the lower part of the whorl, resembling only that in *E. formosæ*, Sowb., render this a very remarkable shell. It has a very wide and perforating umbilicus, in which it is only nearly approached by *E. spirata*, Linn., and a spiral umbilical callus resembling that in *E. canaliculata*.

TURRITELLA EXCAVATA. (Plate XXI. fig. 3.)

T. *testa attenuata, acuminata, tenuiuscula, sublævigata, albida, medio anfractuum castaneo, spiraliter fasciata; anfractibus subelongatis, medio excavatis, supra prope suturam angustatis, tumidis, infra latis, inflatis, rotundatis; apertura subpyriformi, labio profundissime et late supra medium emarginata.*

Hab. Agulhas Bank.

This shell is figured in Reeve's Monograph as a variety of *T. exoleta*, from which species, however, it is quite distinct.

TURRITELLA PUNCTICULATA.

T. *testa robusta, pallide fulva, liris spiralibus numerosis validis, rotundatis, minute punctato-maculatis, et interstitiis sulcatis sculpta; anfractibus rotundatis, numerosis, flammulis fuscatis ornatis, ultimo subangulato, infra angulum planiusculo.*

Hab. Agulhas Bank, S. Africa.

Mus. Taylor.

PLEUROTOMA LATIFASCIATA.

P. *testa attenuata, albida, fasciis latissimis fumeo-castaneis duabus cincta; spira elongata; anfractibus numerosis, brevibus, spiraliter striatis, medio albifasciatis, supra ad suturam granoso-uniliratis, tum excavatis, medio angulatis, costellis longitudinalibus numerosis ornatis, ultimo infra granoso-lirato; apertura brevi, angustiuscula, sinu haud profundo.*

Hab. Hongkong.

Mus. Taylor.

PLEUROTOMA LATERCULATA.

P. *fusiformi, solida, lævigata, longitudinaliter costata, maculis quadratis rubris tessellata; spira pyramidata; anfractibus medio angulatis, ad angulum carinis duabus, ad costas tuberculatis; apertura subpyriformi, labio extus incrassato, prope suturam emarginato.*

Hab. China Seas.

Mus. Taylor.

PLEUROTOMA ALBICARINATA.

P. *testa angusta, scabriuscula, fusca, supra medium acute carinata, ad carinam alba; anfractibus supra et infra carinam acute uniliratis, ultimo medio subcarinato, infra carinam liris acutis et interstitiis longitudinaliter crenulatis sculpto; columella rectiuscula; labio ad carinam albam acute emarginato.*

Hab. Manzanilla.

Mus. Taylor.

This shell differs from *P. oxytropis* in being laterally much more compressed, in being much shorter above the keel, which is sharp and white, and in being altogether more closely sculptured.

CLAVATULA TUMIDA.

C. *testa crassa, subfusiformi, pallide rubescente, epidermide tenui subviridi induta; spira mucronata, convexiuscula, aperturam longitudine superante; anfractibus declivibus, medio concavis uniliratis, supra prope suturam tuberculatis, infra oblique tuberculato-costatis; ultimo obtuse angulato, infra angulum tumidiusculo, lævigato;*

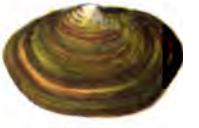












G.B. Sowerby del.

M&N Hanhart imp.

NEW SHELLS.

CONUS MITRÆFORMIS, var. PUPÆFORMIS. (Pl. XXII. fig. 2.)

C. *testa angusta, cylindrica, albida, obscurissime striata.*

Hab. Mauritius.

The more cylindrical form and more produced spire of specimens recently brought from the Mauritius, as compared with the original and subsequently published figures, led at first to the belief that they represented a distinct species. Most of the old specimens in cabinets agree with Bruguière's figure, being thick at the upper part and granulated. The new variety is finely striated, with the colouring more continuous.

CONUS TURRITUS. (Pl. XXII. fig. 14.)

C. *testa elongata, tenui, utrinque eleganter pyramidata, rosea, flammulis rubescentibus infra medium interruptis ornata, ad basim acuminata, striata; spira producta, gradata, acuminata; anfractibus obscurissime undatis, acutissime angulatis, concavis, apice mamillato; apertura rosea, labio postice profunde sinuato.*

Hab. Agulhas Bank, S. Africa.

At first sight, this Cone is slightly suggestive of *C. papillaris*, but it has straight sides, a much more elevated and turreted spire, of which the sharply angulated whorls are not coronated, only very obscurely undated.

CONUS FLORIDENSIS. (Pl. XXII. fig. 11.)

C. *testa solida, subfusiformi, alba, lævi, ad angulum lata, infra angulum fascia latissima subaurea longitudinaliter flammulata et maculis fuscis lineatim dispositis cincta; spira pyramidali, gradata, producta, flammis castaneis brevibus ornata; apertura angusta, labio postice profunde sinuato.*

Hab. Florida (*Mr. Waters*).

A beautifully coloured shell, with moniliform markings, somewhat resembling *C. delessertianus* in general appearance.

CONUS TEGULATUS. (Plate XXII. fig. 12.)

C. *testa subangusta, distanter et æqualiter sulcata, inter sulcos planilirata, super sulcos maculis linearibus in fasciis duabus majoribus longitudinaliter flammulata, sulcis concentrice sculptis; spira concavo-acuminata, angulo acuto; anfractibus spiraliter striatis et concentrice cancellatis.*

Hab. China Seas.

The chestnut linear spots, arranged in longitudinal flame-like bands, and thickened in two spiral bands, give a tessellated appearance to this pretty little sulcated shell.

CONUS TENUISULCATUS. (Pl. XXII. fig. 10.)

C. *testa parva, acuminata, medio et infra tenuiter et distanter sulcata, albida, griseo fasciata, maculis castaneis seu fulvis medio et infra bifasciata; spira acuminata; anfractibus angulatis, maculatis.*

Hab. ——?

Differing from other shells of similar general appearance in the narrow sulci of the middle and lower part of the last whorl.

CONUS CORRUGATUS. (Pl. XXII. fig. 7.)

C. *testa parva, acuminata, liris duplicatis, subrugosis, granulatis et interstitiis minutissime sculptis cincta; supra et infra medium pallide griseo fasciata, strigis minutis fuscatis variegata; spira acuminata; anfractibus cancellatis, acute angulatis, angulis concinne fusco punctatis.*

Hab. ——?

A more slender and much more finely sculptured shell than *C. verrucosus*, with the edges of the whorls neatly spotted with brown.

CONUS SOWERBYI, var. SUBÆQUALIS. (Pl. XXII. fig. 5.)

C. *testa utrinque subæqualiter acuminata, medio acutangulata.*

Hab. China Seas.

Described at first for this paper as a new shell, being remarkable for the length of its spire. It resembles *C. præcellens* in form, but with less numerous ribs, and having the interstices very beautifully sculptured. The spire nearly equals the body of the shell in length. In *C. acutangulatus* the sulci are few, and the intervening spaces flat.

CONUS SEMISULCATUS. (Pl. XXII. fig. 13.)

C. *testa parva, utrinque acuminata, lævigata, fumeo-fuscata, infra medium distanter plano-sulcata, versus extremitatem acuminatim coarctata; spira acutissime angulata, concavo-acuminata; anfractibus plano-concavis, versus apicem moniliferis.*

Hab. ——?

A little brown shell with whorls beaded near the apex.

CONUS GEMMULATUS. (Pl. XXII. fig. 8.)

C. *testa parva, albida, utrinque subæqualiter acuminata, costellis rotundis subrugosis lirata, interstitiis profundis, striis tenuibus longitudinaliter sculpta; spira exserta, producta, valde acuminata; anfractibus numerosis, papillis rotundis regularibus gemmuliformibus coronatis; apertura angusta, labio postice profunde sinuato.*

Hab. China Seas.

A most wonderful fusiform little Cone, with a very produced spire, the whorls of which are beautifully beaded with gem-like papillæ.

CONUS RARIMACULATUS. (Pl. XXII. fig. 4.)

C. *testa albida, acute angulata, lævigata, hic illic castaneo maculata; spira obscure cancellata, acuminata, flammulis castaneis picta.*

Hab. China Seas.

A whitish smooth shell, with very few spots of chestnut.

STROMBUS MIRABILIS. (Pl. XXI. fig. 4.)

S. *testa elongato-fusiformi, ad spiram et anfractum ultimum casta-*

neo fasciata, inter fascias fusco angulatim et undatim strigata, ad dorsum castaneo saturatiore et magis suffuso picta; spira elongata; anfractibus 12 *circa, quorum* 7 *apicalibus subrotundis longitudinaliter costatis, spiraliter inter costas striatis,* 3 *ad* 4 *ultimis lævibus, angulatis, ultimo in canalem caudalem attenuatum valide retrorsus tortuosum terminante; columella lævigata, arcuata, labio albo, late expanso, alato, ad canalem anticum emarginato, prope canalem unilobato, inter lobum et alam sinu maximo emarginato, ala lævigata, rectiuscula, incrassata, in lobum superne elevata, tum profunde emarginata, ad anfractum ultimum elevata.*

Hab. Ceylon.

This very magnificent shell has at first sight the appearance of a gigantic *S. vittatus*, being similarly marked and of a similar general form. In that species, however, the whorls of the spire are sulcated close to the suture, and the slightly winged outer lip is striated and bent inwards at the upper angle, showing nothing like the smooth broad-lobed wing seen in our *S. mirabilis*. Our shell is further characterized by a very large sinus, between the lower part of the wing and the terminal lobe of the outer lip next to the canal, which is curiously curved backwards. The specimen is now in the possession of Mr. G. B. Sowerby, jun.

MITRA INTERSCULPTA.

M. *testa attenuata, alba, flammis longitudinalibus rubro-fuscis picta, costellis spiralibus angulatis basi crenulatis subdistantibus et liris minutis interstitialibus crenulatis cincta; ultimo anfractu oblongo; spira breviuscula; anfractibus* 6, *moderate convexis.*

Hab. Mauritius.

Mus. Taylor.

MITRA PRÆTEXTA.

M. *testa oblongo-ovata, æqualiter liris longitudinalibus crebris et costellis spiralibus cancellata, albido-subcærulea, zonis fuscatis tribus distantibus margine punctatis et maculis interstitialibus distantibus majoribus ornata, anfractu ultimo spiram longitudine æquante; spira producta; anfractibus* 10, *convexis, prope suturam rotundis prominentibus; apertura fumeo-fusca, intus lirata.*

Hab. ——?

Mus. Taylor.

MITRA CORBICULA.

M. *testa breviuscula, turrita, costellis subrugosis spiralibus et liris irregularibus, frequenter duplicatis cancellata, albida seu pallide fulvo-rubescente, ad angulum anfractuum distanter nigro ocellata, ad medium anfractus ultimi fascia frequenter bipunctata cincta, infra medium subirregulariter punctata; spira elongata; anfractibus angulatis, anfractu ultimo brevi.*

Hab. Mauritius.

Mus. Taylor.

This species resembles *M. rugosa*—a Tankervillian shell, believed

to be unique; but it differs materially in form, the spire being much longer than the body-whorl. It also has longitudinal ridges, and is much more neatly and regularly marked.

MITRA INTERSTRIATA.

M. *testa fusiformi, acuminata, costis distantibus lævigatis longitudinalibus et striis spiralibus interstitialibus sculpta, albida; anfractu ultimo in medio aureo latifasciata, supra et infra fasciam inter costas rubro maculato.*

Hab. China Seas.

Mus. Taylor.

MITRA DIMIDIATA.

M. *testa brevi, liris distantibus, lævigatis, rotundis, longitudinalibus, et striis elevatis spiralibus interstitialibus sculpta; spira et anfractu ultimo usque ad medium albis, infra aurantiacis.*

Hab. ——?

Mus. Taylor.

MITRA UMBONATA.

M. *testa brevissima; spira anfractum ultimum longitudine æquante, alba, turrita; anfractibus supra medium angulatis, costis acute bituberculatis armatis; anfractu ultimo ad medium rubro late cingulato, costis paucis supra acute bituberculatis infra crenulatis et supra canalem costa spirali tuberculata armato.*

Hab. ——?

Mus. Taylor.

DESCRIPTION OF THE PLATES.

PLATE XXI.

Fig. 1 *a, b. Typhis duplicatus*, Sowb., p. 251.
2. *Eburna perforata*, Sowb., p. 252.
3. *Turritella excavata*, Sowb., p. 252.
4. *Strombus mirabilis*, Sowb., p. 257.
5. *Solenella subæqualis*, Sowb., p. 250.

PLATE XXII.

Fig. 1. *Conus planiliratus*, Sowb., p. 255.
2. —— *mitræformis*, Brug., var. *pupæformis*, Sowb., p. 256.
3. —— *laterculatus*, Sowb., p. 255.
4. —— *rarimaculatus*, Sowb., p. 257.
5. —— *sowerbyi*, Rve., var. *subæqualis*, p. 257.
6. —— *submarginatus*, Sowb., p. 255.
7. —— *corrugatus*, Sowb., p. 257.
8. —— *gemmulatus*, Sowb., p. 257.
9. —— *suffusus*, Sowb., p. 255.
10. —— *tenuisulcatus*, Sowb., p. 256.
11. —— *floridensis*, Sowb., p. 256.
12. —— *tegulatus*, Sowb., p. 256.
13. —— *semisulcatus*, Sowb., p 257.
14. —— *turritus*, Sowb., p. 256.

7. On the Axial Skeleton of the *Urodela*.

By St. George Mivart, F.R.S.

In this communication I shall confine my observations to the spinal column, neglecting for the present the skull, together with the mandibular, hyoidean, and branchial arches*.

* In a communication read before the Linnean Society on the 21st of April of the present year, I stated my views as to the general and serial homologies of the vertebrate skeleton.

I said that the axial system in its most developed form might be considered as consisting of three longitudinal series of parts, continued for a greater or less extent along each side of the vertebral axis.

The upper longitudinal series of parts on each side together form the system of *epaxial* parts.

The middle longitudinal series of parts on each side together form the system of *paraxial* parts.

The inferior longitudinal series of parts on each side together form the system of *hypaxial* parts.

Epaxial parts were defined as "parts embracing the cerebro-spinal axis, or parts serially homologous with parts which embrace that axis."

Paraxial parts were defined as "parts external to and more or less tending to embrace the pleuro-peritoneal cavity, or parts serially homologous with parts which are so situated in the trunk."

Hypaxial parts were defined as "parts placed between the skeletal axis and some part of the pleuro-peritoneal cavity, or serially homologous with parts so situated.

By epaxial parts I denote the neural arches and lateral walls of the brain-case.

By paraxial parts I denote transverse processes, ribs (both upper and lower of fishes), and sternal bones or cartilages.

By hypaxial parts I denote both hypapophyses, whether exogenous or autogenous, and also visceral arches, however complex.

By "visceral arches" I mean the system of arches forming the hyobranchial apparatus, and also the mandible, the palato-quadrate arch, and the trabeculæ cranii.

In this latter respect I follow the happy and original suggestion of Professor Huxley, as far as regards the resemblance of the trabeculæ cranii to the other visceral arches; but I venture to differ from him as far as regards the general homology of these visceral arches, which I regard not as ribs (*i. e.* paraxial parts), but as hypaxial elements of the skeleton. The position of the heart and aortic roots, with regard to the branchial arches, is, I submit, fatal to their costal character.

The external branchial cartilages of Sharks, and the branchial basket of the Lamprey, however, may really represent costal elements.

In the paper referred to, I gave my reasons for considering the subcaudal arches of fishes to be generally of more or less mixed paraxial and hypaxial nature, differentiation, in this respect, being, I believe, less complete in that class.

This radiating system of skeletal parts of the trunk corresponds to the radiating system of spinal nerves, first pointed out by Professor Huxley in his last course of Hunterian Lectures, the epaxial parts corresponding with the ascending nerves, the hypaxial parts with the nerves of the inner ventral laminæ of the embryo (*i. e.* with the sympathetic), and the paraxial parts corresponding with the nerves of the outer ventral laminæ. Moreover, as there are nerves passing directly outwards (above the abdominal nerves), so it was suggested that there may be an upper and lower series of paraxial parts, perhaps coalescing to form the ribs of the higher vertebrata.

If this view of the visceral arches be accepted, then the nerves accompanying

All the species of the order agree in possessing a spine made up, in the adult condition, of more or less similar vertebræ varying in number from 45 to 112, according to the species or individual. These vertebræ increase slightly and very gradually in size from the second vertebra till about the middle of the body. Thence they decrease again, at first gradually and slightly, but afterwards rapidly, and to such a degree that the last ones are only minute rudimentary ossicles. With the exception of the genus *Siren*, these vertebræ may be arranged in four categories.

1. *Cervical.*—This includes only one vertebra, namely that which articulates with the skull.

2. *Dorsal.*—This includes almost all the trunk-vertebræ, *i. e.* all the vertebræ behind the cervical vertebra, and anterior to the sacral vertebra or vertebræ.

3. *Sacral.*—This includes the vertebra or vertebræ to which the pelvis is attached.

4. *Caudal.*—This includes all the vertebræ posterior to the sacral vertebra or vertebræ.

In the exceptional genus just mentioned (*Siren*) there is no sacral vertebra, and a cervical, and more or less arbitrarily divided dorsal and caudal regions are all that can be distinguished.

Very rarely two contiguous vertebræ will more or less completely anchylose together. I have observed this in the large species *Cryptobranchus japonicus*, where sometimes the last two presacral are fused together, and sometimes the sacral and the first caudal. In a skeleton in the British Museum both these unions occur, so that the four originally distinct vertebræ form actually but a pair, though each shows evident signs of its complex nature.

Every vertebra, except the abortive ones towards the end of the tail, consist of a body (*centrum*), and of a neural arch ossified, I believe, continuously with it. The neural arches constitute *epaxial* parts.

Every vertebra, except the cervical one and the very last caudal vertebræ, is furnished with lateral prolongations, never uniting below and forming complete arches, except by the intervention of the limb

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those arches (the vagus &c.) seem to be serially homologous with that portion of the spinal nervous system which is called sympathetic.

The chevron bones of Mammals, Reptiles, and Amphibia I stated to be, in my opinion, hypaxial parts, and serially homologous with those hypapophysial processes which are so largely developed in the Pelican and the Great Auk, and which, in their azygos condition, are evidently situated in the line of suspension of the inner laminæ of the ventral plates of the embryo. According to this conception, in vertebrates generally we have, at the anterior end of the axial skeleton, hypertrophied epaxial and hypaxial parts, *i. e.* the brain-case and visceral arches. Further back we have hypertrophied paraxial parts with much diminished hypaxial ones. Finally, towards the hinder end of the body (except in tailless forms) we have, in vertebrates above fishes, a reappearance of hypaxial elements generally accompanied by coexisting but distinct paraxial parts. In fishes, in the same region, we have generally paraxial parts in union with more or less of the hypaxial element, or we have paraxial parts only, or, much more rarely, only hypaxial parts.

girdles, and by means of membrane. These lateral structures constitute *paraxial* parts.

These paraxial parts, unlike the neural arches, are not only always incomplete below, but they are not usually ossified continuously with the centra respectively supporting them, but generally consist of two parts—a transverse process and a rib—the rib being somewhat moveably articulated to the distal end of the transverse process. The ribs end freely, except those articulated with the pelvic bones, which are intercalated parts of the appendicular skeleton. Certain vertebræ have transverse processes only, their free ends more or less widely diverging. This is the case with the caudal vertebræ, except the first two or three of them (which sometimes support ribs), and also occurs in many trunk-vertebræ of *Amphiuma*, *Proteus*, and *Siren*.

The caudal vertebræ, except the first one or two and the very last, have almost always inferiorly extending processes and arches, continuously ossified like the neural arches above them, which moreover they resemble, more or less closely, in shape and proportions. They are probably serial homologues of subcentral processes of the trunk-vertebræ; and the whole of these inferior structures belong to a system of *hypaxial parts**, and are the hypapophyses. That such subcentral processes really do answer serially to the caudal hypapophyses behind them, is well shown in *Siren*, where the vertebra in front of that which bears large hypapophyses is furnished with a pair of small backwardly projecting processes exactly like those of *Spelerpes rubra*, but at the same time developed from the posterior end of the ridges, which unquestionably represent the hypapophyses of the vertebræ next behind (fig. 14).

Sometimes instead of, or besides, lateral processes, the inferior surface of a centrum will develope a median longitudinal bony ridge. Such a structure is to be seen in the third and fourth vertebræ of *Siren* (fig. 13, *Hy*), the second and third vertebræ of *Menobranchus*, and in many of the trunk-vertebræ of *Proteus* and *Amphiuma*. This ridge is hypaxial, and may also be spoken of as hypapophysial†, as sometimes in *Siren* and *Menobranchus* it seems, by becoming medianly grooved, to divide into a pair of hypapophyses. The propriety of regarding the subcaudal arches and processes as distinct from paraxial parts is justified by the frequent coexistence of the latter together with subcaudal arches in the tail. Moreover these arches are undoubtedly the representatives of the "chevron bones" of the Crocodile; and these latter were found by Professor Goodsir‡ to be, at the root of the tail, enclosed within the backwardly continued peritoneal folds and abdominal cavity, thus removing them altogether from the

* As before said, I believe the hyobranchial apparatus, jaws and trabeculæ, to also belong to the system of hypaxial parts.

† The way in which the osseous extension (of the under surface of the centrum) related to the great arterial channels is represented by a single process, by a pair of processes, or by a triple development, is well shown by Professor Owen (Memoir on the *Megatherium*, Phil. Trans. 1851, part 2. plate lii. figs. 48–51).

‡ Edinb. New Phil. Journal, January 1857, p. 128.

category of paraxial parts. Were they really hæmal arches (*i. e.* representatives of the membranous connexions between the distal ends of the two series of ribs), we should have to adopt the somewhat violent conception that the lower parts of the hæmal arches of the tail are detached from their proximal portions, and fixed directly to the under surface of each supporting centrum. For if the caudal vertebræ from before backwards are examined, it will be seen that the first hypapophysial arch is not formed by the bending down of the transverse processes, or by an extension of ossification along the membrane, connecting the distal ends of such transverse processes, but that it arises suddenly beneath the centrum. This is well shown in the sixty-fourth vertebra of *Amphiuma* (fig. 1). In this vertebra

Fig. 1.



Under view of last trunk- and anterior caudal vertebræ of *Amphiuma* (No. 579 A in College of Surgeons' Museum*).

Hy. Hypapophysis.

the caudal hypapophysis first makes its appearance as a long process on each side, the two processes being medianly disunited below, and distinct from the transverse process, which exists as completely in this vertebra as in the one preceding it.

The three systems of parts, epaxial, paraxial, and hypaxial, are variously united together respectively.

The epaxial parts, or neural arches, are serially connected together by means of special articular processes, *zygapophyses*. Each vertebra is provided with two of these in front and two behind, the posterior pair of which have their articular surfaces directed downwards, and somewhat obliquely outwards (fig. 16), reposing on the upturned and somewhat inwardly directed surfaces of the anterior zygapophyses of the vertebra next behind. The cervical vertebra forms an exception, inasmuch (fig. 19) as it has no anterior zygapophyses, but has special modifications for articulation with the skull.

The paraxial parts are never serially connected together, but by muscular or connective tissue, except the occasional coalescence of such parts in the sacral region.

The hypaxial parts in the tail form with each other serial connexions more or less simulating those existing between the successive neural arches.

* The figures of specimens in the Museum of the College of Surgeons have been drawn by the kind permission of the authorities of that institution.

Centra, or Vertebral Bodies.

The bodies of the vertebræ unite together by the entire circumference of each of their juxtaposed surfaces, and sometimes by those surfaces also, according to the form and condition of the latter. Each vertebral body consists of a small bony cylindroidal structure, the antero-posterior extent of which considerably exceeds its transverse diameter, which latter about equals its vertical dimension. The length is generally less than twice the breadth; it is about that in the mid trunk-vertebræ of *Menobranchus*, more than that in those of *Amblystoma*, and very much more in those of *Proteus*. Sometimes, as in *Amblystoma* and notably in *Proteus*, the centrum is greatly constricted towards its middle, so as to appear to consist of two cones joined together at their apices, like an hour-glass. The posterior end of each vertebral body is always unossified, and presents a bony concavity filled with gelatinous tissue. Very often the anterior surface of each centrum, except that of the cervical vertebra (hereafter described), is also similarly conditioned, the vertebræ being *biconcave*. Such vertebræ are found in *Siren*, *Proteus*, *Menobranchus*, *Menopoma*, *Amphiuma*, *Amblystoma*, *Plethodon*, *Aneides*, &c. On the other hand, in *Salamandra*, *Triton*, *Pleurodeles*, *Chioglossa*, *Taricha*, *Spelerpes rubra*, &c. the part answering to the anterior cup is not only ossified, but ossification extends continuously and more or less thoroughly into the soft structure filling the cup of the centrum next in advance; so that each vertebral body comes to have a rounded convexity projecting from its anterior surface, and thus to articulate with its neighbour's by an opisthocœlous ball-and-socket joint.

Procœlous vertebræ do not exist in any species of Urodele.

The most posterior centra are sometimes in the form of small rings, the central part of each being unossified and filled with a softer tissue. The centra are commonly (fig. 14) perforated below by small openings for blood-vessels. A centrum may be continuously ossified with a neural arch above, a transverse process on each side, and hypaxial processes in an hypaxial arch below.

Neurapophyses.

The laminæ which ascend on each side to embrace the spinal cord always, in the fully adult condition, unite together above and form a complete neural arch. In the Axolotl, however, the neural arch of the first vertebra (the cervical vertebra) long remains medianly cleft; and in the Urodela generally a more or less deeply extending median notch very frequently divides the posterior part of each neural arch; this is particularly marked in *Siren* (fig. 2). At the point of junction of the neural laminæ (that is, along the summit of each neural arch) a more or less marked antero-posteriorly directed ridge is usually to be detected. This ridge is sometimes very little developed, as in the trunk-vertebræ of *Salamandra*, *Proteus*, and most others. On the other hand, it is a very elevated process in the trunk-ver-

Fig. 2.



Dorsal view of four trunk-vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).

c. Capitular process. *t*. Tubercular process. *i*. Interzygapophysial ridge.

Fig. 3.



Lateral view of four trunk-vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).

c. Capitular process. *t*. Tubercular process. *i*. Interzygapophysial ridge.

tebræ of *Siren* (figs. 3 & 8), *Amphiuma* (fig. 4), *Pleurodeles*, *Triton palmatus*, and some other forms. Very often the neural ridges of the caudal vertebræ are lofty in species which have the neural ridge of their trunk-vertebræ quite inconspicuous. This is the case, *e. g.*, in *Triton cristatus*, *Chioglossa*, &c. Processes from the margins of

Fig. 4.



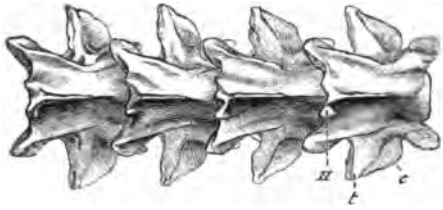
Side view of 23rd, 24th, 25th, and 26th vertebræ of *Amphiuma* (No. 579 A in College of Surgeons' Museum).

H. Hyperapophysis. *c*. Capitular process. *t*. Tubercular process.

the posterior median notch of the neural arches of the trunk-vertebræ often project backwards and more or less conspicuously upwards, preeminently so in *Proteus* (in spite of the low neural crest of that form), also in *Amphiuma* (figs. 5 & 17, *H*) (where the processes are very distinct though short) and *Spelerpes rubra*, and more or less so in *Triton palmatus*, *Pleurodeles waltlii*, &c. This condition is always still more marked in the caudal region, where in *Spelerpes rubra*

these conspicuous productions of the neural arch* ascend almost vertically, as they do in some of the posterior caudal vertebræ of *Siren* (fig. 8), and tend to do in those of *Amphiuma*. The summit of the neural arch in *Urodela* is never produced into a long bony

Fig. 5.



Dorsal view of 23rd, 24th, 25th, and 26th vertebræ of *Amphiuma*.
H. Hyperapophysis. *c.* Capitular process. *t.* Tubercular process.

pointed process, as it is in so many higher vertebrata; but sometimes the middle of its hinder margin projects slightly backwards, as in *Menobranchus*; and sometimes, as in *Menopoma*, *Cryptobranchus*, and *Menobranchus* (fig. 10), the posterior part of the caudal neural arches are produced into long processes inclined obliquely backwards over the succeeding vertebræ; but they are hollow and open at the summit, and are no doubt continued in cartilage. Sometimes again the posterior part of each neural arch, whether of the trunk or of the tail, is marked by a vacuity, pit, or depression, as if for the implantation of the end of a cartilaginous rod or spinous process; this is found in *Cryptobranchus* and *Menopoma*. In *Amblystoma* each neural arch of the posterior trunk-vertebræ possesses two such pits placed side by side in the same transverse horizontal line as if for two cartilaginous neural spines; and the same structure obtains throughout the caudal vertebræ. In the Axolotl the trunk neural arches

Fig. 6.



Dorsal view of three caudal vertebræ (sixth to eighth postsacral) of *Axolotl*, from specimen No. 582c in Museum of College of Surgeons.

have, from before backwards, successively longer and longer neural spines; but each one has a concave depression at its tip, as if it were continued in cartilage. The caudal vertebræ in the same form, from the fourth backwards, have each bifold neural spines, as in the trunk- and all caudal vertebræ of *Amblystoma*; and each is concave at its

* These parts appear to correspond with those mammalian processes for which I have proposed the term *hyperapophyses* (P. Z. S. 1865, p. 576), and the presence of which often serves as a good osteological character for zoological groups. See Cambridge Journal of Anatomy and Physiology, vol. ii. pp. 143–154.

summit, and in the fresh state has evidently a cartilaginous continuation (fig. 6). Rarely (as sometimes in *Menobranchus*) the neural arches, towards the end of the tail, each develope two neural spines, one in front of the other.

As has been said, almost every neural arch has four zygapophyses; but the cervical vertebra has only the two posterior ones. In the tail these processes are all developed on the anterior caudal vertebræ, but the posterior processes abort at about the fifth or sixth caudal vertebra in *Menobranchus*, and at about the seventh in *Cryptobranchus*. In other forms, however, they extend far back—*e. g.* to the last vertebra but four in *Aneides*, to the last but five in *Triton cristatus*, and to the last but nine in *Siren*. The anterior zygapophyses continue to be developed for a longer distance, being traceable in *Aneides* to the last vertebra but four, and in *Cryptobranchus* to the last but three. In *Amphiuma* both continue to the very small vertebræ near the end of the tail.

A longitudinal ridge (figs. 3, 7, 8, 17 *i*), more or less marked,

Fig. 7.



Dorsal view of last trunk- and anterior caudal vertebræ of *Amphiuma*.
Hy. Hypapophysis. *i.* Interzygapophysial ridge.

generally extends along each side of each neural arch between the two zygapophyses of the same side. This interzygapophysial ridge is most marked in *Amphiuma* and *Siren* (fig. 17 and fig. 3), especially in the latter. In other forms it is but little so in the trunk-vertebræ, though often becoming prominent in the caudal ones, as notably in *Chioglossa*.

Fig. 8.



Lateral view of anterior caudal last trunk-vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).
c. Capitular process. *t.* Tubercular process. *i.* Interzygapophysial ridge.

Transverse Processes.

With the exception of the cervical vertebra and of all the caudal vertebræ except the first few, each centrum gives out on each side a large and conspicuous transverse process. More or less completely rudimentary transverse processes are to be traced throughout the

greater number of the caudal vertebræ, and in the genera *Proteus*, *Menobranchus*, and *Siren* (fig. 18) in the cervical vertebra also. Generally the fully developed transverse processes are more or less cylindrical or somewhat compressed from before backwards, their long diameter, however, extending outwards and more or less (fig. 15, *c*) obliquely backwards, as in *Menopoma*, *Cryptobranchus*, *Salamandra*, &c. Sometimes, however, as in all the transverse processes of *Siren* (fig. 9, *c*), except the first one or two, and as in the posterior ones of *Proteus* and the middle ones of *Amphiuma* (fig. 16), each one, though very short, is wide, *i. e.* much extended from before backwards.

Each such transverse process springs generally from about the middle of each centrum's length, but sometimes, as in most posterior trunk-vertebræ of *Siren* (figs. 14 & 9) and *Amphiuma* (figs. 1 & 16), mainly from near the anterior end of each vertebra, and sometimes, as in the anterior trunk-vertebræ of *Amphiuma*, *Menobranchus*, and *Siren* (fig. 13), from near the hinder end of each.

The backward inclination of the distal end of each transverse process is sometimes rather more marked at the anterior part of the series, as in *Siren*, *Amphiuma*, *Menopoma*, and *Cryptobranchus*. Each of these fully developed transverse processes is more or less excavated by a groove or depression on its anterior surface, and another one on its posterior face; and these excavations are often such as to cause more or less of a division of the distal part of such transverse process into a superior portion and an inferior part. It is also to be observed that each transverse process at its point of origin from the vertebra, is connected below with the centrum of such vertebra, while above it is continuous with its neural arch and more or less distinctly continuous with the interzygapophysial ridge. Thus each transverse process may be regarded as made up of two parts, each ending distally in a more or less distinct process, the upper one of which is called the upper or *tubercular* process *, while the lower one is termed the lower or *capitular* one. Similarly it will be convenient to speak of the rib as made up of two portions, a superior tubercular part and an inferior or capitular one. When the transverse process is nearly cylindrical, as in *Salamandra* and most forms, these two component parts are of about equal antero-posterior extent; but sometimes, as in the middle trunk-vertebræ of *Amphiuma* (figs. 4 & 5), *Proteus*, and *Siren* (fig. 2), the capitular part is much wider from before backwards than is the tubercular part. The same is observable in a less degree in *Menobranchus* and *Aneides*. When (as in *Siren* after the first nine vertebræ) the tubercular process is also wide, and the groove before mentioned almost or entirely confined to the front surface, where it is immense, the transverse process assumes the form of two triangular plates (of which the upper is the smaller) united to the centrum by one margin and to each other by their two posterior edges, leaving a space between them which widens as they (the plates) diverge forwards (fig. 3, *c. i*). This space or fossa,

* By analogy with the condition of higher vertebrates in which the rib has a "tubercle" and a "head" respectively articulating with parts homologous with those here described.

open in front, is thus bounded internally by the centrum, superiorly by the tubercular process, and inferiorly by the capitular one.

Fig. 9.



Underview of four trunk-vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).
c. Capitular process. *Hy*. Hypapophysis.

The distal end of each trunk- transverse process is provided with two superimposed articular surfaces for corresponding parts of each rib; these surfaces may be in close apposition, as in *Cryptobranchus* and others, or they may be separated by the before-described distal tendency to bifurcation of the transverse process as in *Menobranchus*, *Amblystoma*, and others. The only exceptions are offered by many of the trunk-vertebræ of *Siren*, *Proteus*, and *Amphiuma*, in which forms only the more anterior trunk-vertebræ support ribs. The transverse process of the last trunk-vertebra (which is connected indirectly with the pelvic girdle) is generally stouter than the others.

In the caudal region this part generally undergoes a marked change, though sometimes, as in *Cryptobranchus* and *Menopoma*, the transverse processes of the caudal vertebræ remain much the same (except successively decreasing in size) as their anterior homotypes—the first two, at least, having still the double distal articular surface.

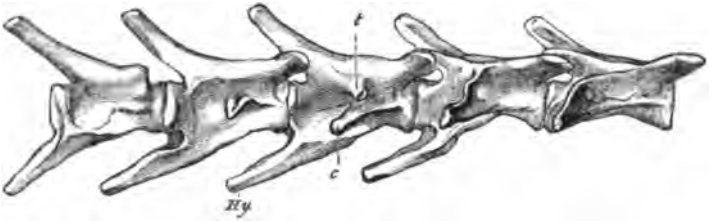
In most cases, however, as in *Menobranchus*, the process becomes more pointed at its free extremity, and generally, in the anterior caudals, projects more or less directly outwards and but little backwards also, unlike the more anterior transverse processes. Sometimes, as in *Siren* (fig. 8), the tubercular part of the transverse process becomes entirely suppressed at the second, third, or fourth caudal vertebra provided with large hypapophyses, while the capitular part remains traceable for a variable distance further back along the tail, even to the last vertebra but thirteen in *Siren**. In *Cryptobranchus* every trace of a transverse process disappears at the ninth or tenth caudal vertebra, if not earlier, and at the seventh or eighth in *Menopoma*, and sixth or seventh in *Menobranchus*. Sometimes, as in *Salamandra*, traces of the transverse process exist almost to the end of the tail.

Occasionally, as in *Triton palmatus* and *Pleurodeles waltlii*, and others, the caudal transverse processes soon cease to project much outwards, but are to be distinguished for a very long distance as ridges connecting the interzygapophysial ridge above with the

* *E. g.* in Brit. Mus. specimen.

oblique one which traverses (in a downward and backward direction) the outside of each hypapophysial arch. This condition is perhaps best exemplified in the caudal vertebræ of *Chioglossa*, where the transverse process is in just such a condition as would be one of those of the midtrunk of *Siren*, if its tubercular and capitular parts were so reduced as to be mere prominent ridges on the side of the centrum instead of strongly projecting, more or less horizontal plates. Thus in *Siren* we have the tubercular process extending downwards and backwards from the interzygapophysial ridge and ending in a backwardly projecting process, which is also the termination of the capitular process, the free edges of the plates forming an angle open forwards. Now in *Chioglossa* we have a ridge (the representative of the tubercular part of the transverse process) running downwards and backwards from the interzygapophysial ridge, and terminating in a backwardly projecting process, which process is also the termination of another ridge which runs forwards and downwards from it, and is the representative of the capitular part of the transverse process. This latter ridge, as it descends, unites with the ridge traversing obliquely the outside of the hypapophysial arch, and terminating behind and below in one of the posteriorly projecting processes of that arch hereafter described.

Fig. 10.



Lateral view of anterior caudal vertebræ of *Menobranchus* (No. 582 A in College of Surgeons' Museum).

t. Tubercular process. *c*. Capitular process. *Hy*. Hypapophysis.

Sometimes both the capitular and tubercular parts of the transverse process are to be seen distinctly projecting out (though of small size) one above the other (fig. 10, *c*. *t*), from the side of a caudal vertebra, as *e. g.* sometimes, at least, in the fourth caudal vertebra of *Menobranchus*. Occasionally a certain osseous connexion exists between the caudal transverse process and the hypapophysial arch, or caudal hypapophyses. This is the case sometimes in the first one or two vertebræ of *Siren* which possess hypapophyses.

In *Menobranchus* also a bony connexion distinctly exists, in the third and fourth caudal vertebræ, between the root of the hypapophysial arch on each side and the under surface of the capitular process above it (fig. 15). This shows a certain degree of imperfection in the separation of the hypaxial part of the skeleton from the paraxial part.

The transverse processes at their roots, *i. e.* near their origin from the centrum, are often traversed by a canal passing from behind forwards and transmitting an artery. This is well seen in *Cryptobranchus*, *Menopoma*, *Menobranchus*, and *Salamandra*.

Ribs.

With the exception of the genera *Amphiuma*, *Siren*, and *Proteus*, all the transverse processes of the dorsal* and sacral regions support ribs, and not unfrequently the anterior caudal ones also.

The first vertebra of all, however, even when furnished with a rudimentary transverse process, remains always destitute of such bony appendages.

The ribs form a series of cylindroidal bones (figs. 11, 12, 13 & 18), each extending outwards and more or less downwards and backwards, and ending distally in a free pointed termination, with the exception of the single pair attached (one on each side) to the hip-girdle. They never have cartilaginous or osseous parts attached to their distal ends and answering to the sternal ribs or cartilages of most higher vertebrates. Rarely, as in more or fewer of the ribs of *Axolotl* and *Amblystoma*, they extend rather upwards and backwards. The number of ribs varies from five or six pairs in *Amphiuma*†, eight in *Siren*‡, seven, eight, or nine in *Proteus*§ (if the second vertebra bears any) to some twenty-one or twenty-two pairs (counting the caudal ribs) in *Menobranchus* and *Cryptobranchus*. Proximally the ribs very commonly bifurcate into two short and nearly equal branches, diverging from each other at a more or less acute angle (fig. 12). These branches are placed one above the other, and are attached respectively to the tubercular and capitular parts or processes of the respective transverse processes. The upper branch of this fork may

Fig. 11.



Lateral view of first four vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).

thus be called the tubercle (*tuberculum*) of the rib, and the lower branch its head (*capitulum*). When, as in *Siren*, *Menopoma*, and *Cryptobranchus*, the distal articular surfaces of the transverse processes are near together, the proximal ends of the ribs do not bifurcate,

* Rusconi represents none to the first dorsal of *Proteus*.

† Cuv. Mém. du Mus. vol. xiv. 1827, p. 9. The College of Surgeons specimen looks as if it had had ten pairs at least.

‡ Cuv. Oss. Foss. 4th edition, vol. x. p. 350.

§ Cuvier (*loc. cit.* p. 358) says seven, counting from the second vertebra. Rusconi represents seven, beginning with the *third* vertebra: the last is so small as to be with difficulty detected.

but nevertheless show indications of separation exactly corresponding to the distal ends of the transverse processes to which they are attached, having two superimposed articular surfaces when the last-mentioned processes have such, and presenting a longitudinal groove in front and behind each rib, the two grooves being most marked at the proximal end of the rib, and vanishing distally.

The number of trunk ribs which thus bifurcate proximally is sometimes as many as eighteen* on each side; but the number is subject to some variation even in the same species. Thus in some individuals of *Salamandra maculata* (fig. 12) I have found three ribs (on each side) thus bifurcating, in others six; and in *Triton cristatus* twelve pairs of ribs will sometimes be thus conditioned. It is always, however, towards the anterior and posterior ends of the trunk that this bifurcation tends to disappear, and mainly towards its posterior end, the bifurcation generally commencing at the second vertebra when the first one has its proximal end undivided. The sacral rib rarely bifurcates†, and it generally differs from the preceding ones by its greater stoutness, though it is usually short. The ribs in general maintain a tolerable equality of length throughout the trunk; very rarely (only in *Taricha*) the ribs increase markedly in length towards the middle of the body, and then as obviously become again shorter. In *Axolotl* the second, third, or fourth is the longest pair, and thence backwards they markedly decrease in length to the sacral, which is suddenly much longer again. Occasionally they are very short indeed, being much less in length than the vertebræ to which they are attached; this is the case especially in *Proteus*, *Amphiuma*, and *Siren*, where they are rudimentary (the posterior ones being quite so) and, as has been said, few in number. In *Spelerpes*, *Amblystoma*, and especially *Plethodon*, they are very short indeed, never, except very slightly, exceeding a single vertebra in length. Generally they do not equal in length two midtrunk-vertebræ of the same individual; but *Pleurodeles* differs from all the other *Urodela* in the length and strength of its ribs, the longer ones considerably exceeding the length of two of the longest vertebræ of the body.

As has been said already, ribs are not unfrequently developed behind the sacrum. I have seen two such pairs in *Glossoliga poireti*, and traces of such in *Plethodon* and *Amblystoma*; one at least is sometimes present in *Menobranchus*, and often two and sometimes three (if not more) pairs are present at the root of the tail in *Menopoma* and *Cryptobranchus*. These postsacral ribs, however, never bifurcate at their proximal ends, and they are always short and more or less rudimentary.

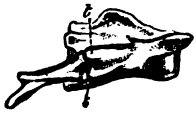
The first rib of all is generally stouter as well as shorter than the ribs of the trunk which follow after (fig. 11). Not unfrequently it developes a process from its outer or upper side towards its distal end; this process projects outwards and somewhat upwards, and very rarely is so considerable as almost to equal in size the remainder of

* *Spelerpes rubra*, British Museum.

† It does so in *Spelerpes rubra* and *Amblystoma punctatum* in Brit. Mus.

the rib beyond the point from which it starts (figs. 11 & 12). In this case the rib may be truly said to bifurcate distally.

Fig. 12.



Lateral view of sixth vertebra of *Salamandra* (No. 589 B in Museum of College of Surgeons), showing rib bifurcating at each end.
c. Capitular process. *t*. Tubercular process.

A similar process is also sometimes developed from the same part of the ribs next succeeding; but it is rarely to be traced beyond the fourth pair of ribs, and diminishes in size as we proceed from before backwards, and in many forms is not to be detected at all, as far as I have observed, e. g. *Menopoma*, *Cryptobranchus*, *Menobranchus*, *Aneides*, *Spelerpes rubra*, and *Plethodon*.

Though, as has been said, the ribs of the opposite side are never connected together by hard parts, but only by membranous prolongations, yet in the middle line of the anterior part of the body there is in many *Urodela* a solid structure answering to the sternum of higher animals, and connected with the membranous prolongations of the ribs.

The Sternum.

This part is a constant structure in adult *Urodela*, except in *Proteus*, *Menobranchus*, and perhaps *Siren*. It is rhomboidal in shape, about as broad as long, and with an apex turned forwards. Sometimes, e. g. *Salamandra*, there is a short xiphoid process, which extends backwards from the middle of its hinder margin. Rarely (e. g. *Axolotl*) that margin is medianly notched.

Each side of the sternum is more or less deeply grooved for the reception of the coracoid lamella, and the inner lip of each groove is much more developed than the outer one.

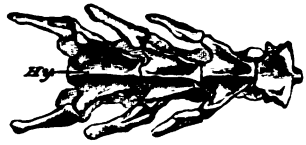
The sternum never ossifies in any Urodele, and originally it is always formed *within* the coracoids. This might be expected to be the case from the fact that the sternum is a portion of the paraxial skeletal system which the pectoral girdle externally surrounds. But Mr. Parker* has actually verified by observation this primitive condition of the sternum, and proved that the lateral parts of the structure, which embrace the coracoid lamellæ externally, are subsequent and secondary outgrowths of a structure which is at first completely internal to the shoulder-girdle. These secondary growths are so large that ultimately the sternum comes to lie outside the coracoids†.

* See 'Shoulder-girdle,' p. 65.
† Parker, *l. c.* pl. 3. fig. 14.

Hypapophyses.

That system of inferior arches, or parts of such, which is in more immediate relation with the great dorsal artery attains in the *Urodela* its full development only in the caudal region, where it appears as the hypapophyses and hypapophysial arches. In the trunk the most anterior indication of this system of parts is found (1) in the anterior trunk vertebræ of *Siren* and *Amphiuma* (fig. 13), and more

Fig. 13.



Under view of first four vertebræ of *Siren* (No. 576 B in Museum of College of Surgeons).

Hy. Hypapophysis.

or less in *Menobranchus* (beginning with the second or third vertebra), where there is a median antero-posteriorly extended subcentral crest, and (2) in certain small bifold processes found in *Amphiuma* (fig. 16) and *Spelerpes rubra*. These processes may project forwards, as in the first-named genus, from the anterior margin of the under-surface of each centrum, except the first three, close to the anterior end of the hypapophysial ridge; or, as in *Spelerpes rubra*, they may project backwards from the hinder part of the under surface of all the præcaudal vertebræ, except the first and the last one or two. This ridge is more or less divided (fig. 14) medianly into

Fig. 14.



Under view of transitional vertebræ (from trunk to tail) of *Siren* (No. 576 B in Museum of College of Surgeons).

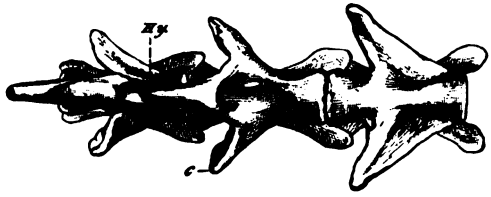
Hy. Hypapophysis.

two in that vertebra of *Siren* which precedes the first one provided with conspicuous hypapophyses, and also in the second vertebra, and in the second and third of *Menobranchus*. The first caudal vertebra is always destitute of any hypapophysis*; and very often the second

* In a skeleton of *Cryptobranchus japonicus* in the British Museum the apparent first caudal is really the second one, the true first caudal has coalesced with the sacral vertebra. This really second caudal has a long hypapophysis on one side, although the transverse process is furnished with a distinct though small rib.

caudal is in the same case; but at the third, or sometimes the second caudal, this process suddenly reappears, greatly increased in size and generally united with its fellow of the opposite side, forming the first hypaxial arch. Such arches (figs. 1 & 15) are always present in the

Fig. 15.

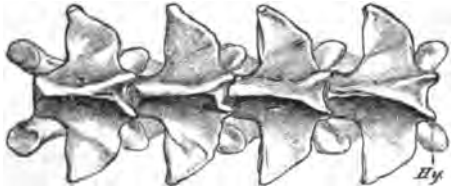


Under view of anterior caudal vertebræ of *Menobranchus* (No. 582 A in College of Surgeons' Museum).
c. Capitular process. *Hy*. Hypapophysis.

caudal vertebræ, except in *Siren*; but there, though the caudal hypapophyses remain medianly disunited below, yet each is broad anteroposteriorly, as well as much vertically extended (fig. 8, *Hy*). The hypaxial arches are sometimes narrow from before backwards, though much elongated from above downwards; this is the case in *Menopoma*, *Cryptobranchus*, *Menobranchus* (fig. 10, *Hy*), and *Proteus*. In the three first-named genera especially they are produced obliquely backwards and downwards into long inferior spines, even exceeding in length the neural spinous processes above them, and are similarly bony cylinders unossified at their summits. In *Axolotl* and *Amblystoma* the hypaxial arches repeat the characters offered by the neural ones, inasmuch as each is provided with a pair of diverging sockets (fig. 6) apparently for the reception of two cartilaginous spines placed side by side.

The posterior margin of these hypaxial or hypapophysial arches

Fig. 16.



Under view of 23rd, 24th, 25th, and 26th vertebræ of *Amphiuma*.
Hy. Hypapophysis.

is often medianly notched like the corresponding margin of the epaxial or neural arches above. This correspondence is often further increased by the frequent development of a median longitudinal hypaxial crest, which, bifurcating at the notch, is continued forwards

into each arm of the notch (fig. 16), ending in two strongly projecting processes, like the similarly conspicuous productions of the caudal neural arches before described. These processes are also especially marked in *Proteus*, *Amphiuma* (fig. 17), and *Spelerpes rubra*, and more or less so in *Triton palmatus*, *Pleurodeles waltlii*, &c. In *Spelerpes rubra* these prominences descend almost vertically, corresponding with the position of their vertical homologues above. The median inferior crest is often more vertically extended than is the corresponding neural one, as is the case in the species last mentioned (except *Amphiuma*, where there is hardly any median inferior crest, and then only in the very posterior caudals) and in *Aneides*. These backwardly projecting lateral processes extend over the anterior part of the hypaxial arch next behind, and thus somewhat simulate posterior zygapophyses; but these arches have no true articular processes, as is well seen in such forms as *Cryptobranchus*, *Menopoma*, and *Amphiuma*, where the contrast is marked. Very generally, as in *Triton*, *Amphiuma* (fig. 17), *Pleurodeles*, and, above all, in

Fig. 17.



Last trunk- and anterior caudal vertebræ of *Amphiuma* (No. 579 A in College of Surgeons' Museum).

H. Hyperapophysis. *Hy.* Hypapophysis. *i.* Interzygapophysial ridge.

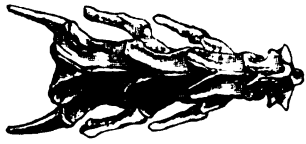
Chioglossa, an oblique ridge extends backwards and downwards from the anterior point of attachment of each half of the hypaxial arch to the backwardly projecting inferior process of the same side. These ridges appear to be the only parts of the hypapophyses that are left in those forms in which the hypapophysial arches are very narrow. They somewhat resemble the interzygapophysial ridges of the caudal neural arches, but are more oblique in direction.

The Cervical Vertebra.

The vertebra which comes first and articulates in front with the skull differs importantly from all the vertebræ which succeed it. Like the others, it constantly presents a centrum which is concave behind, and from which a continuous, ascending neural arch is developed. But not only are there no hypapophyses, but transverse processes are completely absent, except in *Siren* (fig. 18), *Proteus*, and *Menobranchus*; and in these genera they are quite rudimentary, while the vertebra is invariably destitute of any costal appendage or rib. But it is the anterior face of the vertebra which is most remarkable. This presents on each side (at the junction of one half

of the neural arch with the body) a large concave articular surface which receives one of the projecting articular processes or *condyles* of the posterior end of the skull. Moreover the median part of the vertebra, instead of presenting either a concavity (like the hinder

Fig. 18.



Dorsal view of first four vertebræ of *Siren* (No. 576 B in College of Surgeons' Museum).

surface) or a rounded articular ball (like that always present in the other vertebræ of Opisthocœlous forms such as *Salamandra*, *Triton*, &c.) exhibits between the two anterior large articular concavities a small or considerable median process* (fig. 19). This projects forwards and fits into a recess at the base of the skull between the two posterior (*occipital*) condyles, and generally bears on each side of it a small articular facet; but sometimes these two facets are united into one continuous articular surface on the inferior and infero-lateral aspects of the process.

Fig. 19.



Lateral, dorsal, and under view of first vertebræ of *Amphiuma* (No. 579 A in Museum of College of Surgeons).

This azygos part attains its maximum of development in *Amphiuma*. It is small in *Axolotl*, but at its minimum in *Menobranchus* and *Proteus*, especially the latter. As far as I have observed or been informed, no bony or cartilaginous part is ever developed between the neural arch of the cervical vertebra and the skull; that is to say, if this cervical vertebra is really the axis, then the neural arch of the atlas vertebra of higher vertebrates is quite absent in the *Urodela*. The size of the cervical vertebra, as compared with that of succeeding vertebræ (*e. g.* with the third) varies somewhat.

In most cases the two vertebræ are of nearly equal length and size; but in *Amphiuma* the cervical vertebra is rather smaller than the third; and it is much so in *Menobranchus* and *Proteus*, in the last especially, where it is very remarkable for its small size.

* It is the presence of this process which renders it probable that the cervical vertebra is an axis vertebra and not an atlas one.

Dorsal Vertebræ.

The vertebræ interposed between the cervical vertebra and the sacrum vary in number from twelve (*Taricha*) to sixty-three (*Amphiuma*). They are always the largest vertebræ of any one individual axial skeleton.

All have neural arches and anterior and posterior zygapophyses.

Except in *Siren*, *Proteus*, and *Amphiuma*, all these vertebræ support a transverse process and a rib on each side of the body.

Some few forms have small hypapophysial processes (e. g. *Spelerpes*), or single median ridges, or such ridge more or less cleft longitudinally. The various parts and processes of the vertebræ have been already described.

Sacral Vertebra.

Never more than one vertebra is normally connected with the hip-girdle; but not very unfrequently the ilium of one side is connected with the transverse process of one vertebra, while the other ilium attaches itself to another vertebra. The transverse process of the sacral vertebra is generally stout, as also the annexed rib. The latter is especially predominant, as compared with the ribs in advance of it, in *Axolotl*. In *Proteus* and *Amphiuma* this vertebra is without a rib. In no genus does it develope a hypapophysial process.

Caudal Vertebræ.

These vertebræ always decrease in size successively from before backwards; the last ones are often merely little bony ossicles without processes of any kind. The number of caudal vertebræ varies from 22 in *Cryptobranchus japonicus* *, and sometimes in *Menobranchus*, to about 43 in *Amphiuma* or 53 in *Siren*. All except the more posterior ones are provided with neural arches and, with the exception of the first one or two, with hypapophyses. These latter unite to form hypaxial arches in all the species except *Siren*. Transverse processes are sometimes to be traced for a great distance along the tail, as in *Siren*, *Chioglossa*, &c. Sometimes, as in *Cryptobranchus* and *Menopoma*, every trace of them disappears at the seventh or eighth caudal vertebra. Sometimes both tubercular and capitular processes stand out distinctly one above another, as occasionally in the fourth vertebra of *Menobranchus* (fig. 10, *c*, *t*). Small ribs are sometimes attached to the first caudal vertebra, and also to the one or two following ones, as in *Menopoma* and *Cryptobranchus*.

Anterior and posterior zygapophyses are always developed in the anterior caudals, and continue backwards for a variable, sometimes (e. g. in *Amphiuma*) for a great extent. But it is here unnecessary to recapitulate details as to the various parts and processes of these vertebræ, which have already been given under the various preceding headings.

* In Brit. Mus.



CANIS LATERALIS

May 12, 1870.

Professor Newton, V.P., in the Chair.

The Secretary read notices of the more important additions to the Society's Menagerie during the month of April, and called particular attention to:—

1. A female Rusine Deer, purchased April 13th, and stated to have been received from the Philippines.

The Rusine form of Deer of the Philippines was still very imperfectly known. The present animal was of small size, about equalling that of the Hog-deer (*C. porcinus*), but more slender in form. It was very dark in colour, being of a nearly uniform dark brown; the ears short and rather rounded, apparently naked on the outside. Round the eye was a pale mark; the tail beneath and insides of thighs were white; and the white metatarsal gland-patches were very prominent.

This Deer had been for the present designated *Cervus marianus*—the Deer of the Marianne Islands (upon which this term had been founded by Desmarest), having been stated to have been introduced into those islands from the Philippines *.

2. A Jackal, purchased April 1st, and stated to have been brought from the River Fernand Vas, south of the Gaboon, and to be the animal referred to in Du Chaillu's 'Explorations and Adventures in Equatorial Africa' (p. 243) in the following passage:—

"Before we got to town again I shot a *Mboyo*, a very shy animal of the Wolf kind, with long yellowish hair and straight ears. I have often watched these beasts surrounding and chasing small game for themselves. The drove runs very well together; and as their policy is to run round and round, they soon bewilder, tire out, and capture any animal of moderate endurance."

Mr. Sclater stated that he had in vain endeavoured to find a name for this very distinctly marked species of the genus *Canis*. There did not appear to be any specimen at all resembling it in the British Museum. It was not possible to describe it accurately from the living individual; but the animal appeared to be at once distinguishable from every described species of the genus by the black and white stripe extending along the flanks, and the very long black tail with a distinct white termination. Mr. Sclater proposed as a temporary designation for this species the name of the Side-striped Jackal (*Canis lateralis*), and exhibited a drawing by M. Keulemans (Plate XXIII.) representing it. Its general size and appearance was that of the Black-backed Jackal (*Canis mesomelas*), from which, however, it was readily recognizable by its sharper and more pointed snout, the distinct side-stripes, and the long, white-tipped tail†.

* See Quoy et Gaim. Zool. Voy. Uranie, p. 33.

† Since this notice was written I have received a letter from Dr. Peters (to whom I had sent a copy of the number of the 'Illustrated London News' of April 30th, containing a figure of this animal, p. 465), suggesting that the species

3. A Sooty Crow-shrike (*Strepera fuliginosa*, Gould) from Australia, purchased April 13th; believed not to have been previously exhibited, and making the third species of this peculiar Australian genus now living in the Society's Gardens. The other two species represented were the Grey Crow-shrike (*Strepera anaphonensis*) and the Pied Crow-shrike (*Strepera graculina*).

4. An Angulated Tortoise (*Testudo angulata*) from South Africa, believed to be the first individual of this rare species obtained alive by the Society.

5. A Vulturine Guinea-fowl (*Numida vulturina*) from Brava, on the Somali coast of Eastern Africa, presented to the Society by Dr. John Kirk, C.M.Z.S. Dr. Kirk had despatched from Zanzibar in a steamer to Marseilles, *viâ* the Suez Canal, a single female of this fine Guinea-fowl, along with a small collection of other animals, the remainder of which were expected to arrive in a few days. Living specimens of this Guinea-fowl had already reached the Zoological Gardens of Hamburg; but this was the first individual that had been brought alive to England. The Council had taken steps to endeavour to obtain, through Dr. Kirk's kind agency, a further supply of specimens of this bird, which, if successfully acclimatized, would prove a great ornament to our poultry-yards.

The following papers were read:—

1. Notes on some Points in the Anatomy of three Kingfishers (*Ceryle stellata, Dacelo gigas,* and *Alcedo ispida*). By Robert O. Cunningham, M.D., F.L.S., C.M.Z.S.

(Plate XXIV.)

In the course of three seasons spent in the Strait of Magellan and the channels on the west coast of Patagonia, I had several op-

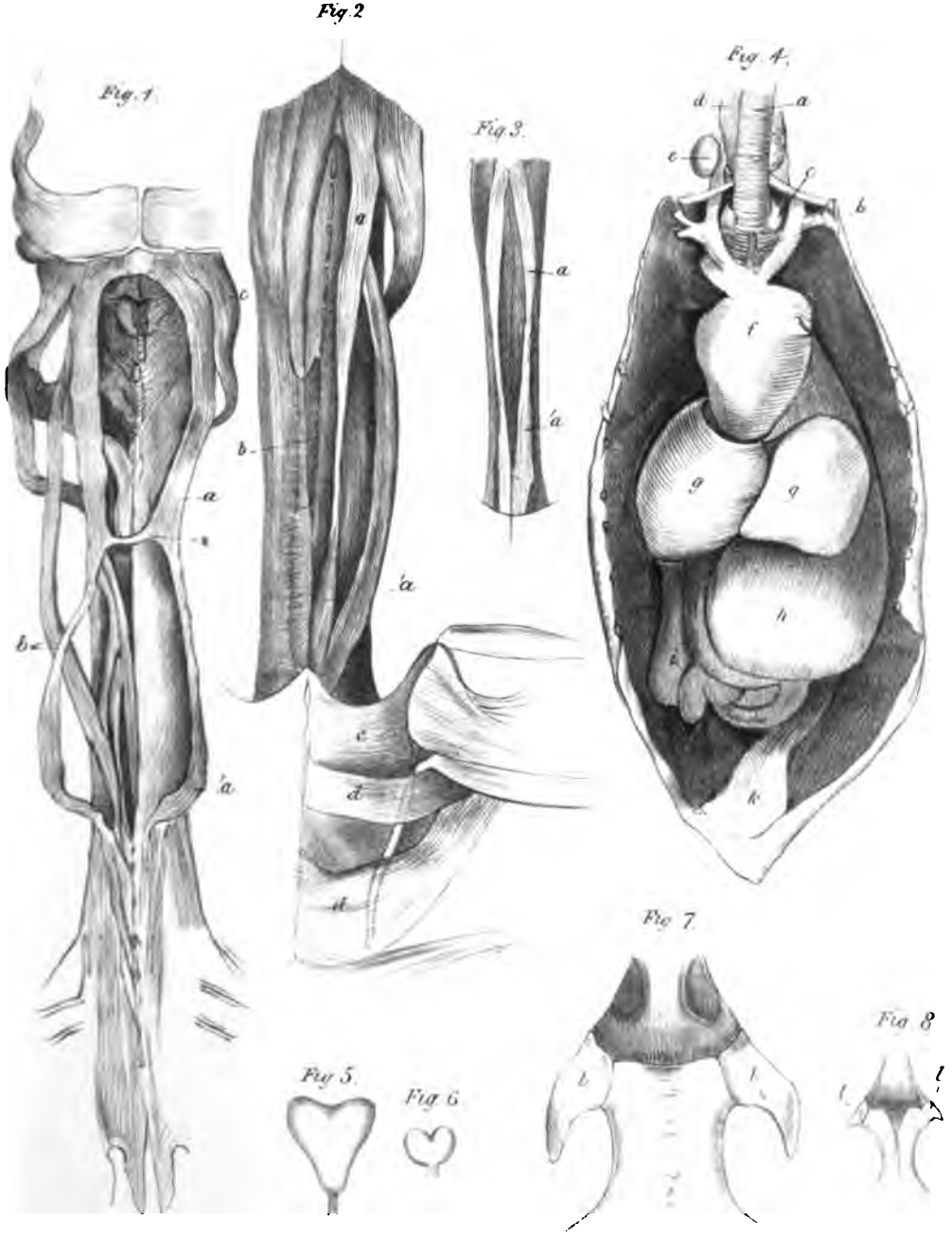
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may be *Canis adustus* of Sundevall, described 'Kongl. Vet. Ak. Förh.' 1846, p. 121, as follows:—

"Canis adustus, n. *griseus, varieyatus, pilis dorsi crassis, ante apicem nigrum late albis (curvatis); cauda nigricante, apice alba, pilis terram attingentibus; auriculis extus fuscis. Affinis* C. mesomelæ *et præsertim* C. antho, *Crzm. Sat gracilis, capite angustato, elongato (fere ut in* C. familiari *grajo), linea faciali recta. Dentes, ut in* C. variegato *et affinibus, sat vulpini; tubere alto, interno in d. ferino superiore. Pili dorsi et laterum fere ut in* C. variegato *colorati sed in adultis, quos habemus, parte alba sat crassa, curvata, apiculo nigro hic illic amisso, indeque speciem pilorum igne adustorum præbentes. Cauda basi pallida, dein vero pilis pallidis, apice longe nigris. Apex caudæ pilis totis albis. Pulluli habent pilos corporis tenues, simplices, minus albos, caudam vero ut in adultis coloratam. Adultus* 785 *mm.* + *cauda* 330 (*c. pilis* 430); *planta c. u.* 170. *Altitudo dorsi* 450, *caput* 185. *Habitat in Caffraria interiore.*"

This animal was also met with by Dr. Peters in Mozambique (Reise n. Moz. Mamm. p. 25), and by Dr. Welwitsch in Angola (*cf.* P. Z. S. 1865, p. 400); but in neither case were perfect specimens obtained.

Dr. Peters (who is much better acquainted with African Mammals than I am) is very probably right in his identification; but it may be remarked that Sundevall says nothing about the lateral stripes, which are very noticeable and very peculiar in this Jackal.—P. L. S.



M. & N. Hanhart, imp.

MYOLOGY OF KINGFISHERS.

portunities of examining specimens of *Ceryle stellata*, which is not uncommon in these dreary regions, and may frequently be observed perched on the branch of a tree overhanging the water, keeping a vigilant look-out for its finny prey. It occasionally utters a harsh stridulant note, and appears to be a bird of a bold disposition, an individual on more than one occasion having alighted on the lower rigging of the ship and remained there composedly for some time.

While skinning a specimen shot at Port Otway in the Gulf of Peñas, in the month of April 1868, my attention was arrested by what appeared to me a peculiarity in one of the superficial muscles of the back of the neck, *i. e.* the *biventer cervicis*. This muscle, which I have had an opportunity of examining in a variety of birds of different orders, generally differentiates itself from the other spinal muscles at the lower portion of the cervical region, and, extending throughout the entire extent of the neck, is inserted into a prominent ridge on the occiput. As a rule it consists of an upper and lower muscular portion or belly separated by an intermediate strong tendon of varying extent. The greatest part of this tendon, as well as the lower muscular portion, is finely bound down along the back of the spine by a strong aponeurotic sheath, which, however, permits of a free gliding motion within it. Of the two muscular portions, the lower, according to Meckel, who has described some of the principal modifications of this muscle in the third volume of his 'System der vergleichenden Anatomie,' is much the larger; but this is not the case in the Kingfishers, according to my observations. On carefully dissecting the muscles in several specimens of *Ceryle stellata*, I found that the corresponding muscles of opposite sides were united at the junction of the tendon with the upper muscular portion by a narrow but strong transverse tendon (see Plate XXIV. fig. 1), and that, in addition to this, a strong membrano-tendinous junction was likewise present between them at their insertion into the occiput. As I had never observed this connexion between the opposite muscles in any of the other birds examined by me, I was anxious to procure specimens of some other species of Kingfishers in order to ascertain whether the like peculiarity obtained in them also; and this I have been enabled to do through the kindness of my friend Mr. Sharpe, who has furnished me with specimens of our common Kingfisher (*Alcedo ispida*) and the Laughing Jackass of Australia (*Dacelo gigas*). On dissecting an example of the former of these birds (shot in the beginning of February of this year), I found that a considerable space, filled with fat, intervened between the *biventer* of each side, and that there was no trace of a tendinous union between them (see Plate XXIV. fig. 3); further that the aponeurotic sheath binding down the lower portion of the muscle to the spine was very feebly developed. In the latter bird (Plate XXIV. fig. 2) the muscles lay closer together, and there was a very strong aponeurotic sheath, but no tendinous connexion. It is therefore not improbable that this may be either a generic or specific peculiarity; how arising, or for what purpose provided, I am not prepared to say.

I may add a few remarks on some other points in the anatomy of the three birds. The tongue of *Ceryle stellata* and that of *Alcedo ispida* bear a close general resemblance to each other and differ widely in form from that of *Dacelo gigas*. In the first two (figs. 1 & 2) it is broad, thin, flat, and sharply acuminate at the tip, while in *Dacelo* (fig. 3) it is much thicker proportionally and of a sagittate form.

Fig. 1.

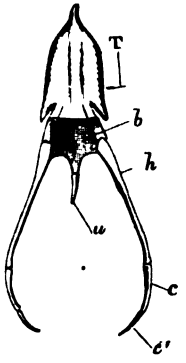


Fig. 2.



Fig. 3.

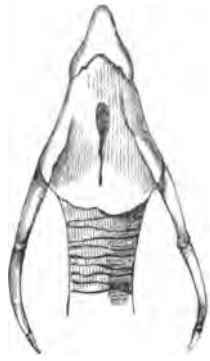


Fig. 1. Tongue of *Ceryle stellata*: *b*, basihyal; *u*, urohyal; *h*, hypohyal; *c*, cerato-hyal; *c'*, cartilaginous piece.
2. Tongue of *Alcedo ispida*.
3. Tongue of *Dacelo gigas*.

The bronchial tubes in *Alcedo ispida* are considerably longer proportionally than those of *Dacelo gigas*. In the latter bird a well-marked subtriangular pale yellowish-red gland exists at the external side of the origin of each bronchus; and traces of a similar structure exist in the former. The length of the œsophagus in *Dacelo gigas* is $5\frac{1}{2}$ inches, and that of the intestinal canal 27 inches. There are no cæca. The diameter of the first portion of the intestine, which was distended with food, greatly exceeded that of the succeeding portions in the specimen examined. The dimensions of the digestive tube in *Alcedo* I could not accurately ascertain, as the viscera were considerably injured; but Macgillivray, who has figured the digestive organs of this species not very satisfactorily (the form of the tongue being incorrectly given, and the stomach represented as much more muscular than it is in reality), states the length of the œsophagus as 3 inches, and that of the intestine as $10\frac{1}{2}$ inches. The liver was larger in proportion and more elongated in form in the specimen of *Alcedo* than in that of *Dacelo*. The specimen of *Dacelo* examined was a female which had died in the beginning of February; and the left ovary was of a narrow oblong form, its length being $3\frac{1}{2}$ lines, and its breadth $1\frac{1}{2}$ line. The oil-glands of *Dacelo* and *Alcedo* differ considerably: in the latter the gland is deeply divided into two lobes, while in the former the anterior margin is only slightly exca-

vated. As I have not made an examination of the osteology of these birds, I will merely point out that there is a remarkable osteological difference in the orbit of *Dacelo* from that of *Alcedo* and *Ceryle*, which is at once apparent on removing the skin from the crown of the head, the lachrymal bone in the former bird attaining the development so characteristic of the Falconidæ and Strigidæ, in which it contributes to roof-in the eye.

DESCRIPTION OF PLATE XXIV.

Fig. 1. Muscles of back of neck of *Ceryle stellata*: *a*, *a'*, upper and lower bellies of *biventer cervicis* (aponeurotic sheath removed on each side); *, transverse tendon; *b*, longus colli posticus; *c*, complexus.
2. Muscles of back of neck of *Dacelo gigas*: *a*, *a'*, upper and lower bellies of *biventer cervicis*; *b*, aponeurotic sheath retained on left side; *c*, trapezius; *d d*, latissimus dorsi.
3. Muscles at back of neck of *Alcedo ispida*: *a*, *a'*, upper and lower bellies of *biventer cervicis* (aponeurotic sheath removed).
4. Viscera of *Dacelo*: *a*, trachea; *b*, bronchus; *c*, gland; *d*, œsophagus; *e*, lymphatic gland; *f*, heart; *g*, liver; *h*, stomach; *i*, convolutions of intestine; *k*, cloaca.
5. Oil-gland of *Dacelo gigas*.
6. Oil-gland of *Alcedo ispida*.
7. Orbit of *Dacelo*: *l*, lachrymal.
8. Orbit of *Alcedo*: *l*, lachrymal.

2. On the Taxonomic Characters afforded by the Muscular Sheath of the Œsophagus as regards Sauropsida and other Vertebrata. By George Gulliver, F.R.S.

This paper is intended to show that the subject of it deserves more attention than it has yet received; to which end some of the results of my observations will be briefly noticed, referring for more particulars to my descriptions in the 'Proceedings of the Zoological Society' for September 10, 1839, June 14, 1842, and April 22, 1869. And if, by now again calling attention to the question, it should receive such additional investigations as may lead to a more accurate and extensive knowledge of the taxonomic value of the œsophageal sheath, the object of the present communication will be attained.

Although more than a quarter of a century has passed since the observations above cited proved that either the comparative distribution, or presence, or absence, of the transversely striped muscular fibre of the œsophagus may afford good diagnostics between certain large groups and subsections of Vertebrates, and Leydig has confirmed my results as to the deficiency of this fibre in the œsophageal sheath of Sauropsida, these facts have not yet been entertained in the books of systematic zoology and comparative anatomy.

This neglect may have been caused by the complete investigation of the subject being somewhat tedious, requiring extensive examinations with good instruments, and relating to morphological arrange-

ments of which neither the significance nor the importance is very obvious. Besides, in the current 'Anatomy of Vertebrates,' the descriptions in this department are either so perfunctory or dogmatically incorrect as to repel research. Thus we have no notice whatever of the kind of muscular fibre composing the œsophageal sheath of any vertebrates, except when, in a comparison of this sheath of certain birds with that of ruminant mammalia (ii. p. 158, iii. p. 470), there occurs the singular notice that in this order the muscular fibres of the œsophageal coat "are of the striated kind." Hence the false doctrine might arise that the intimate structure of this muscular sheath is generally insignificant throughout the vertebrate subkingdom, and that the sheath of striated muscular fibre of the œsophagus in Mammalia is confined particularly to the order Ruminantia; whereas the œsophageal sheath of striped muscle is by no means confined in Mammalia to the Ruminants; for it exists more or less throughout the class, as well as in Fishes. Besides the Ruminants, several different orders or families of Mammalia have a sheath of this striated fibre extending all along the œsophagus to or even on the cardia, as may be well seen, for example, in Rodents, Bears, and many others; while this kind of muscle in Man, Quadrumana, Felidæ, the Horse, and several more Mammalia stops on the œsophagus much short of its cardiac end. The comparison of the muscular coat of the œsophagus of Owls, and other Raptorial Birds that regurgitate their food in "castings," with the corresponding sheath in Ruminants is erroneous; for this sheath is deficient in the striated muscular fibre in Owls and other birds, while striated muscle composes the chief portion of the coat of the œsophagus of Ruminants.

Though numberless observations may be required to obtain and methodize all the facts, very easy and simple examinations will suffice for single diagnoses; just as, by an inspection of one part, we can arrive at the whole character of a plant or animal which had originally been determined by far more extensive researches. Constant differences in morphological arrangements are not the less important because we happen to be ignorant of their meaning. To define the exact value in taxonomy of the muscular sheath of the œsophagus requires far more extensive researches than I have been able to complete; but my observations show that it certainly affords valuable characters.

Comparative anatomists have long since perceived many resemblances between birds and reptiles; and of late Professor Huxley (Proc. Zool. Soc. 1867, p. 415 *et seq.*) has so more particularly determined the characters common to these two classes as to form them into his one great group of "Sauropsida." Accordingly he describes more exactly and comprehensively than had been previously done those points in which the two classes, constituting that one primary group, agree together and differ from Mammalia. But both he and his predecessors have neglected the œsophageal sheath, although it appears probable, from the observation cited above, that this presents good characteristics.

In short, in those observations the transversely striated muscular

fibre was not found to compose the sheath of the œsophagus of either Birds or Reptiles, while a coat of this fibre was always seen to invest more or less of the œsophagus of Mammalia and Fishes. Here, then, is a remarkable character in which Birds and Reptiles agree together and differ from Mammals and Fishes.

Nor is it less noteworthy that while Sauropsida are thus distinguished by the absence of striated muscular fibre on the œsophagus, they are, on the other hand, equally distinguished by the presence of this fibre within the eye. At least I have never found striated muscular fibres in the eye of any mammal or fish, nor have I ever failed to find those fibres in the eyes of Sauropsida; and this agrees with the older observations of other anatomists. But further researches are yet required on this subject.

So, too, of the œsophageal sheath, both in the larval and perfect states, of Batrachia. As of *Lepidosiren*, a reputed fish, the blood-disks, according to my observations (Ann. Nat. Hist. October 1848, and Proc. Zool. Soc. 1862, fig. 17, p. 101), have a Batrachian character, it would be interesting and instructive to compare the œsophageal sheath of this creature with the same part of other allied vertebrates. In my note-book occurs the following account: —"Dec. 14, 1848. *Lepidosiren* from the West Coast of Africa: œsophagus membranous, wide and very dilatable, many striated muscular fibres mixed with smooth ones on the gullet backwards, as far as the hind end of the pericardium; the œsophagus a third of an inch further back, and thence to the stomach, quite destitute of any thing like striated muscular fibre." This examination is at present worthless, from a want of the comparisons above mentioned, but may prove valuable whenever they are made.

As already noticed, I have never found the whole œsophagus of Fishes and Mammalia destitute of a sheath of striated muscular fibre; and in certain sections of the class Mammalia the extent of that sheath is so different as to afford, so far as my observations have gone, good diagnostics. Thus in the Rodentia and Ruminantia this striated fibre does, and in Man and Quadrumana does not, invest the cardiac end of the œsophagus. And in different sections of one and the same order there may be similar differences; of the Carnivora, *e. g.*, the striated muscular fibre does not clothe the cardiac extremity of the œsophagus in the Felidæ, but extends quite to that termination in the Ursidæ.

That such differences are always invariable cannot, in the present state of our knowledge, be peremptorily affirmed; but that they are constant in many vertebrates is certain. How far such characters may tend to favour the validity of the great group of Sauropsida, or of only the two primary vertebrate sections of Pyrenæmata and Apyrenæmata (Proc. Zool. Soc. 1862, p. 91, and Journ. Anat. and Phys. v. 2), remains to be seen by the light of more knowledge.

Finally, when all the diagnostics between Sauropsida and Mammalia are well and truly reviewed, it now appears that the characters furnished by the intimate structure of the muscular fibre must receive more attention than has hitherto been given to them.

3. On the *Hirundinidæ* of the Ethiopian Region.

By R. B. SHARPE, F.L.S., Libr. Z.S., &c.

I propose in the present paper to give an outline of the African Swallows; and as I possess a very good series of specimens in my private collection, I am induced to hope that these notes may be of some service to the future student of these difficult birds. So slight is at present our knowledge of the different species of Swallows that I cannot expect the present attempt to be by any means perfect, especially as there still remain some few species, of which I have been unable to examine specimens. Nevertheless I venture to hope that the labour bestowed upon it will in some small measure conduce to the benefit of ornithological science, and that it may prove the groundwork on which some more experienced writer may build a surer structure. I have endeavoured to work out the subject in the manner which Messrs. Sclater and Salvin have pursued in their well-known "Synopsis of the American Rallidæ" *. A more useful contribution to ornithology has, in my opinion, never been published; and were every essay to be prepared in the same accurate and careful manner, the student would have little difficulty in the determination of those species at present so puzzling.

It is by no means an easy task to define clearly tangible characters by which the various genera of the *Hirundinidæ* may at once be distinguished. The most efficient treatment of their classification that I have met with is the arrangement proposed by Professor Baird in his 'Review of American Birds;' but from his having chiefly American Swallows to deal with, his conclusions are not always satisfactory when such genera as are strongly represented in the Old World have to be considered. I shall, however, more than once have to express my indebtedness to his painstaking exposition of the family *Hirundinidæ*, throughout the course of the present paper.

It is very curious to note the close affinity of some of the forms found in the African continent with those found in the Nearctic, and more especially the Neotropical, region. As a rule the affinities of Africa are closer to South America; but with the Swallows the opposite is the case, and the balance of relationship is in favour of North America, especially in the instance where a South-African species, *Petrochelidon spilodera*, is so closely allied to the North-American *P. lunifrons*, as at first to have been mistaken for it. As in the New World, so in Africa a group of rough-winged Swallows is found; and so different in form are these from all the other *Hirundinidæ* that it is proposed to separate them as a separate subfamily, *Psalidoprocninæ*, to include the African genus *Psalidoprocne* and the American genus *Stelgidopteryx*.

Hitherto all authors on African ornithology have included among the *Hirundinidæ* one or more species of *Atticora*; but this genus, I

* P. Z. S. 1868, p. 442.

firmly believe, is not represented in the Ethiopian Region. It must be remembered that the type of the genus *Atticora* is the *Hirundo fasciata* of Gmelin, a Brazilian species, remarkable for its small round nostrils, which are devoid of any overhanging membrane. Professor Baird states that the only two specimens of *A. fasciata* examined by him had only ten tail-feathers: but this must have been accidental; for I examined the large series recently brought home by Mr. Edward Bartlett from the Peruvian Amazons, and every bird had its full complement of twelve tail-feathers. Admitting that *Petrochelidon*, which is represented in Africa, is a distinct genus from *Atticora*, which I consider to have been satisfactorily proved by Professor Baird, I submit that a species of true *Atticora* has yet to be discovered in Africa, until which time the genus must be banished from the catalogue of its avifauna.

In the consideration of the rest of the family I follow Professor Baird in deeming the nostrils to be the chief distinguishing characteristic, and particular attention must be paid to the presence or absence of an overhanging membrane on the upper edge of the nostril. In the true Swallows and Martins it is always present, while in the *Atticora* group it is not developed. The genera and subgenera included by Professor Baird in this latter group are *Progne*, *Phæoprogne*, *Petrochelidon*, *Atticora*, *Notiochelidon*, *Neochelidon*, *Pygochelidon*, and *Stelgidopteryx*, of which number, however, the learned Professor only admits *Petrochelidon*, *Atticora*, and *Stelgidopteryx* as worthy of generic rank. As before mentioned, it is my intention to separate the latter genus along with *Psalidoprocne* as a distinct subfamily. It is, however, more with Professor Baird's second group of Swallows, in which he includes the genera and subgenera *Hirundo*, *Tachycineta*, *Cotyle*, and *Callichelidon*, that we have to deal in the present paper, inasmuch as, *Tachycineta* and *Callichelidon* being admitted to be only subgenera, we have left *Hirundo* and *Cotyle*, both of which are strongly represented in the Ethiopian Region. I think, however, Professor Baird has laid too much stress on the small tuft of feathers on the inner base of the tarsus as a generic character of *Cotyle*; for in our common Sand-Martin (*Cotyle riparia*), the only American species of the genus, this is indeed very strongly developed, but in every other species of the genus that I have seen it is absolutely wanting, and should therefore be taken as of specific rather than of generic importance. The genus *Chelidon* is easy to distinguish, by reason of the densely feathered tarsi. *Waldenia* has been lately proposed by me for the reception of the *Hirundo nigrita* of Gray. My friend Dr. O. Finsch thinks that this bird is only subgenerically separable from *Progne*; but although in many respects there is a resemblance, yet in the bareness of the upper joint of the tarsus in *Waldenia* is very different from *Progne*, which has it densely feathered, and this character alone is of strong generic importance. I have in conclusion to thank the many kind friends who have lent me specimens or otherwise assisted me in the preparation of the present paper.

Treating the subject in precisely the same manner as Messrs.

Sclater and Salvin in their excellent paper before referred to, I first divide the *Hirundinidæ* into two subfamilies, as follows:—

a. primarii primi pogonio externo valde serrato..... *Psalidoprocninæ.*
b. primarii primi pogonio externo lævi ..... *Hirundininæ.*

These two subfamilies appear to contain 38 African species, belonging to 7 genera, viz.:—

Psalidoprocninæ..... 1 genus: 4 species.
Hirundininæ ..... 6 genera: 34 species.

Subfam. I. PSALIDOPROCNINÆ.

Genus 1. PSALIDOPROCNE.

Type.
Psalidoprocne, Cab. Mus. H. Th. i. p. 48 (1850). *P. holomelæna.*
Pristoptera, Bon. Riv. Contemp. Tor. 1857, p. 4. *P. pristoptera.*

Clavis specierum.

a. pileo nigro.
a'. cauda furcata.
a''. subalaribus nigris..... 1. *holomelæna.*
b''. subalaribus albis ..... 2. *pristoptera.*
b'. cauda integra..... 3. *nitens.*
b. pileo albo..... 4. *albiceps.*

1. PSALIDOPROCNE HOLOMELÆNA.

Hirundo holomelas, Sundev. Œfv. Vet. Ak. Förh. Stockh. 1850, p. 108 (descr. orig.); Hartl. Journ. f. Orn. 1855, p. 360; Grill, Zool. Anteckn. p. 36 (1858); Layard, Ibis, 1864, p. 134; Gray, Hand-l. of B. i. p. 70 (1869).

Atticora holomelas, Cass. Cat. Hirund. Phil. Acad. p. 6 (1852); Hartl. Orn. Westafr. p. 25 (1857); Layard, B. of South Afr. p. 57 (1867).

Psalidoprocne holomela, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Psaliaoprocne holomelæna, Sclater, P. Z. S. 1864, p. 108.

Atticora hamigera, Cass. Proc. Phil. Acad. 1850, p. 57, pl. 12 (descr. orig.).

Psalidoprocne cypselina, Cab. Mus. Hein. Th. i. p. 48 (1850, descr. orig.); Müll. Journ. f. Orn. 1855, p. 4.

Atticora obscura, Temm. MS. in Mus. Ludg., *undè*

Atticora obscura, Hartl. Journ. f. Orn. 1855, p. 35 (descr. orig.); *id.* Orn. Westafr. p. 26 (1857); *id.* Journ. f. Orn. 1861, p. 103.

Hirundo obscura, Hartl. Journ. f. Orn. 1855, p. 360; Gray, Hand-l. of B. i. p. 71 (1869).

Male. Above dark greenish black, deepest in the centre of the back and on the breast; quills deep black with a slight greenish lustre, the outer web of the first primary distinctly serrated; tail dark greenish black, long, and deeply forked; bill black; feet brown. Total length 5·4 inches, of wing 4·1, tail 3, tarsus 0·3, middle toe 0·3, lateral toes 0·2.

Female. Similar to the male, but smaller and somewhat more

dusky, the outer edge of the external primary not serrated*, and the tail less forked.

Hab. Cape Colony (*Layard, Surtees*); Swellendam (*Cairncross*); Knysna (*Andersson*); Natal (*Ayres*); Gold Coast, Saccondé (*Pel, Mus. Lugd.*); Ashantee (*Mus. Brit.*).

As the typical specimens of the present species came from Natal, I have thought it best to describe a bird from that locality; and I have therefore taken my description from a fine male, collected by Mr. Ayres in Natal, and kindly lent to me by the Rev. H. B. Tristram. There are also specimens from Natal in the British Museum, and Mr. Gray is inclined to keep them distinct from the Cape-Colony specimens; but I cannot agree to separate them, as the only difference is the slightly brighter plumage of the Natal bird. This I take to be a seasonal distinction; for the adult specimen from the Gold Coast in the Leyden Museum is equally brightly glossed.

Although this Swallow is apparently a migrant, the exact range of its migration is not yet quite satisfactorily defined. Mr. Cairncross, who has contributed some interesting notes to Mr. Layard's 'Birds of South Africa,' states in that work that, although met with in the neighbourhood of Swellendam, it does not appear to breed there. Mr. Layard himself observed the bird in the Knysna district "apparently breeding in holes in the banks, but he was unable to investigate its doings more closely." Specimens of *Psalidoprocne obscura* (Temm.), which species is nothing but the *young* of the present species, are in the British and Leyden Museums. I have examined the type of Temminck's *Atticora obscura* in the latter collection, and am satisfied about this identification. The original specimen was collected by Pel along with fully adult birds of *Ps. holomelæna* on the Gold Coast. I may mention that Mr. G. R. Gray also agrees with me in considering the *Atticora obscura* of Hartlaub to be only the young of *Psalidoprocne holomelæna*; nor will this conclusion, I believe, be called in question by any one who examines the birds in the British Museum.

I subjoin the measurements of the West-African specimens above mentioned, in juxtaposition with a large series in my own collection from Southern Africa.

No.	Sex.	Locality.	Authority.	Long. tot.	Al.	Caud.	Remarks.
1.	....	Rio Boutry..	Pel	5·0	3·6	....	Types of *Ps. obscura* (Temm.).
2.	♂	Saccondé ..	„	6·4	3·7	....	
3.	....	Elmina	Nagtlas	4·0	3·5	....	
4.	♂	Caffraria....	Wahlberg ..	5·8	4·1	....	
5.	....	Ashantee....	Mus. Brit. ..	4·4	3·4	2·3	
6.	♂	Natal	Ayres	5·4	4·1	3·0	
7.	♂	S. Africa....	Layard	6·0	4·3	3·25	
8.	♂	„	„	6·1	4·3	3·3	
9.	♂	„	Surtees	6·3	4·4	3·6	
10.	♂	Knysna	Andersson ..	5·8	4·35	3·6	
11.	♂	„	„ ..	5·8	4·3	3·3	
12.	♂	„	„ ..	5·5	4·35	3·25	
13.	♀	„	„ ..	5·3	3·8	2·7	
14.	♀	„	„ ..	5·1	4·0	2·4	
15.	♀	„	„ ..	5·5	3·8	2·6	

* In the genus *Stelgidopteryx* also the female differs from the male in not having the outer primary serrated.

Specimens 1 to 4 are in the Leyden Museum; and I am glad to see that no. 3, which has been more recently received than Temminck's types, has been labelled by Professor Schlegel *H. holomelæna*. This shows that he holds the same opinion as myself; for if *Psalidoprocne obscura* were a distinct species from *Ps. holomelæna*, the bird sent by Governor Nagtlas from Elmina would belong to the former species, as it is absolutely identical in coloration with the type—that is to say, is more dusky underneath than ordinary adult *Ps. holomelæna*.

Colonel Grant, in his 'Walk across Africa' (p. 127), speaks of a Swallow having been observed, *all black* in colour, which Drs. Finsch and Hartlaub, in their new work on East-African Ornithology, suggest may possibly have been *Ps. obscura*. Dr. Th. von Heuglin, in his 'Ornithologie Nord-Ost Afrika's' (p. 148), goes further and includes it (with a query) as a species occurring within his limits, but on no other authority than the quotation from Colonel Grant's work. I cannot see that there is any good reason for supposing that this was the bird observed; and it is just as likely to have been a sex of *Ps. albiceps*.

2. PSALIDOPROCNE PRISTOPTERA.

Hirundo pristoptera, Rüpp. N. Wirb. t. 39. fig. 2 (1835, descr. orig.).

Atticora pristoptera, Gray, Gen. of B. i. p. 58 (1845); *id.* Cat. Fiss. Brit. Mus. p. 21 (1848); Bonap. Consp. Gen. Av. i. p. 337 (1850); Müll. Journ. f. Orn. 1855, p. 4; Heugl. Journ. f. Orn. 1861, p. 420, et 1863, p. 4; Brehm, Reise nach Habesch, p. 208 (1863).

Chelidon pristoptera, Rüpp. Syst. Uebers. p. 22 (1845).

Chelidon (?) pristoptera, Heugl. Syst. Uebers. p. 17 (1856).

Psalidoprocne pristoptera, Sclater, P. Z. S. 1864, p. 109; Heugl. Orn. N.-O. Afr. p. 148 (1869); Blanf. Geol. & Zool. Abyss. p. 349 (1870).

"*Atticora albiscapulata*, Rüpp.," Boie, Isis, 1844, p. 172.

Atticora albiscapulata, Gray, Hand-l. of B. i. p. 73 (1869).

Pristoptera typica, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Above glossy blue-black, with a greenish tinge on the wings and tail; quills greenish black, the inner web dusky; tail much forked, greenish black above, dusky underneath; under surface of the body glossy blue-black; under wing-coverts white. Total length 5·5 inches; of bill from front 0·2, from gape 0·4; wing 4·4; tail 3·0; tarsus 0·35, middle toe 0·4, hind toe 0·2, lateral toes 0·25.

Hab. North-eastern Africa; Galla Country, Central and Northern Abyssinia to 17° N. (*Heuglin*); Dongolo, Tigré (*Blanford*).

According to Von Heuglin, this species is a migratory bird in Abyssinia, and appears about the end of April or the beginning of May in the localities above given. It lives in pairs in the rocky parts of the country from 4000 to 10,000 feet above the sea, breeds about the beginning of July in holes in the rocks, and lays two white eggs. It has two broods a year. Von Heuglin (*l. c.*) also gives some more, very interesting details respecting its habits.

The description and measurements are taken from an adult specimen kindly lent me by Mr. Blanford. He shot it himself on the 15th of May, 1868, at Dongolo in the province of Tigré, at an elevation of 6500 feet. He also informs that he saw it occasionally in the highlands of Abyssinia and also in the Anseba valley, but never below 4000 feet elevation.

3. PSALIDOPROCNE NITENS.

Atticora nitens, Cass. Proc. Acad. Philad. 1857, p. 38 (descr. orig.); Hartl. Orn. Westafr. p. 261 (1857); Cass. Proc. Acad. Philad. 1859, p. 33; Hartl. Journ. f. Orn. 1861, p. 103; Du Chaillu, Equat. Afr. p. 472 (1861).

Above glossy greenish black, very bright and distinct both above and below; quills dark brown, glossed with greenish above, as also is the tail, which is quite square; bill black; feet light brown. Total length 4·3 inches, wing 3·8, tail 2·2.

Hab. Muni and Ogobai Rivers, Gaboon (*Du Chaillu*).

This is a beautiful little Swallow, of apparently a more robust build than either *Ps. hotomelæna* or *Ps. pristoptera*, which, by reason of their long forked tails, have a graceful and slender appearance. The plumage of the present species is also much more brilliant and glossy. The description and measurements are from a very fine skin in the British Museum, from West Africa.

4. PSALIDOPROCNE ALBICEPS.

Psalidoprocne albiceps, Sclater, P. Z. S. 1864, p. 108, pl. xiv.; Heugl. Orn. N.-O. Afr. p. 147.

Atticora albiceps, Finsch & Hartl. Orn. Ost-Afr. p. 133 (1869).

I am unable to give a detailed description of this beautiful Swallow, as the original specimen, which was preserved in spirit and presented by Dr. Sclater to the British Museum, cannot now be found. The following is Dr. Sclater's original description:—

"*P. nigra, pileo et gula summa albis.*

"Long. tot. 5·5, alæ 4·2, caudæ rectr. ext. 3·1, rectr. med. 2·2 poll.

"Capt. Speke has brought home in spirit from Uzinza a single example of this apparently new Swallow of the section *Psalidoprocne*. It seems to form a third of this little African group, which is distinguished from true *Hirundo* by its long cleft tail, short tarsi, small feet, and the saw-like margination of the outer edge of the first primary."

Colonel Grant has mentioned it in his 'Walk across Africa' (p. 127), and has also very kindly favoured me with a note:—

"Extract from my journal dated 'Usui, Central Africa, Oct. 16, 1861. Black Swallow with white forehead and throat under the jaw, with forked tail. Black Swallow, smaller*. Seen together about scarped rocks; at least it was here I first observed them."

* This is the bird referred by Von Heuglin to *Ps. obscura*. I think it just as likely to be the female of *Ps. albiceps*.

Subfam. II. HIRUNDININÆ.

Conspectus generum Hirundininarum.

a. tarsis plumosis ..... 2. *Chelidon.*
b. tarsis nudis.
  a'. naribus supra membrano haud obtectis.
    a''. naribus rotundatis ..... 3. *Petrochelidon.*
    b''. naribus ovalibus ..... 4. *Phedina.*
  b'. naribus supra membrano obtectis.
    a''. rectrice extima haud producta ..... 5. *Cotyle.*
    b''. rectrice extima producta; cauda furcata.
      a'''. tarso superiore nudo ..... 6. *Waldenia.*
      b'''. tarso superiore plumoso ..... 7. *Hirundo.*

Genus 2. CHELIDON.

	Type.
Chelidon, Boie, Isis, 1822, p. 550	*Ch. urbica.*

Clavis specierum.

a. pogonio interno rectricis extimæ fuliginoso-nigra..... 1. *urbica.*
b. pogonio interno rectricis extimæ basin versus albo notato .... 2. *albigena.*

1. CHELIDON URBICA.

Chelidon urbica, Rüpp. Neue Wirb. p. 106 (1835); *id.* Syst. Uebers. p. 22 (1845); Bolle, Journ. f. Orn. 1854, p. 460; Müll. Journ. f. Orn. 1855, p. 3; Heugl. Syst. Uebers. p. 17 (1856); *id.* Journ. f. Orn. 1861, p. 419; Brehm, Reise nach Habesh, p. 272 (1863); Heugl. Orn. N.-O. Afr. p. 168; Blanf. Geol. & Zool. Abyss. p. 349 (1870).

Hirundo urbica, Keul. Ned. Tijdschr. iii. p. 384 (1866).

Hab. North-eastern Africa and Arabia (*Heuglin*, av. migr.); Koomayli (*Blanford*); Cape Verde Islands (*Bolle*); Ilha do Principe (*Keulemans*).

Dr. von Heuglin states that this species is "a bird of passage in North-eastern Africa and Arabia, in February and March, and again from August to the beginning of October, partly singly, partly in great flocks, in company with other species." Mr. Blanford shot a female at Koomayli on the 2nd of February, 1868.

Dr. Bolle (*l. c.*) refers to its appearance in the Cape Verde Islands in great swarms in April 1852 at Fuertaventura. They disappeared as suddenly as they came. The most extraordinary fact in relation to the migration of the present bird is its occurrence in Prince's Island, on the West Coast of Africa. Here Mr. Keulemans shot it under the circumstances mentioned in the accompanying note with which he has favoured me:—

"During the month of January I was living at a plantation about 1500 feet above the sea-level, and I was one evening very much surprised to see a Swallow flying round my house. I had before often seen Swifts (*Cypselus abyssinicus*), but never a Swallow before in that neighbourhood. As it was rather late in the evening, and I had no small shot in my gun, I was obliged to let it go, hoping to see it again afterwards. Fearing lest I might lose the chance of

getting the bird, I stayed at the plantation the whole of the next day, keeping a sharp look-out, till at last my patience was rewarded by observing the Swallow about 5 o'clock in the afternoon flying round in company with the Swifts. As it came once pretty near, a well-directed shot secured the bird; but, as bad luck would have it, the upper mandible and almost the entire head were blown away by the discharge, so that it was quite spoilt for preserving. However curious the appearance of a House-martin so far south may have been, there was no question about the identity of the species, the feathered legs setting all doubts on this point at rest. The natives of Prince's Island who saw me kill the bird were as much surprised as myself, never having seen the species before on the island. I may add that this was the only time I met with *Hirundo urbica* during my travels in Western Africa."

2. CHELIDON ALBIGENA.

Chelidon albigena, Heugl. Journ. f. Orn. 1861, p. 419; *id.* Orn. N.-O. Afr. p. 169 (1869).

Ch. *affinis* Ch. urbicæ, *sed rectrice extima macula alba basin versus notata distinguenda.*

Hab. Bogos Country (*Von Heuglin*).

Never having seen the present bird, I am unable to furnish a detailed description. According to Dr. von Heuglin it is allied to *Chelidon urbica*, but differs in the circumscribed cheek-stripe, the scarcely forked tail, the colour of the abdomen, and the white spot on the inner web of the outer tail-feather. This last character appears to me to be the most striking, and will serve to distinguish the species. Dr. von Heuglin obtained his specimens in the neighbourhood of Keren in the Bogos Country, where, however, it was not met with by Messrs. Blanford and Jesse.

Genus 3. PETROCHELIDON.

Type.

Petrochelidon, Cab. M. Hein. Th. i. p. 47 (1857). *P. melanogaster.*

1. PETROCHELIDON SPILODERA.

Hirundo spilodera, Sundev. Œfv. Kongl. Vet. Akad. Förh. Stockh. 1850, p. 108 (descrip. orig.); Gray, Hand-l. of B. i. p. 70 (1869).

Phedina spilodera, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Hirundo lunifrons, Layard, B. of S. Afr. p. 56 (1867, errore).

Hirundo alfredi, Hartl. Ibis, 1868, p. 153, pl. 4 (descrip. orig.).

Head dark brown, obscurely glossed with dark blue; lighter brown towards the nape; back and scapularies deep blue, the feathers edged latitudinally with white, giving a striped appearance to the whole back, the scapularies and wing-coverts just faintly edged with rusty white; the lower part of the back blue, not marked with the stripes; rump and upper tail-coverts pale rufous; wing-coverts and quills brownish black, a slight blue gloss on the latter and

on the extremities of the quills; tail brownish black, also slightly glossed with blue; a patch of feathers in front of the eye pale sienna; cheeks, ear-coverts, and sides of the neck dark blue; chin white, throat tinged with sienna and covered with little black spots, below this a blackish band marked with whitish; under surface of the body white, washed on the upper part of the breast and on the flanks with sienna, a few scattered black spots on the breast; under tail-coverts and vent pale rufous, some of the former entirely black, and the others rufous with a blackish spot. Total length 5·9 inches; of bill from front 0·4, from gape 0·6; wing 4·5; tail 2·1; tarsus 0·5, middle toe 0·45, hind toe 0·2.

Hab. Middleburg, Cape Colony (*Jackson, Layard*); Transvaal (*Ayres*).

The exact locality of the specimens originally described by Prof. Sundevall is not given; but, as they were collected by Wahlberg, it is most probable that they came from Caffraria or Natal.

I had for a long time been puzzled as to what the true *Hirundo spilodera* of Sundevall really was; and I was therefore delighted to find at Leyden one of the typical specimens collected by Wahlberg and received in exchange from the Stockholm Museum. I at once saw that the lately described *Hirundo alfredi* of Hartlaub was identical, as any one will admit who compares the two diagnoses. That of Prof. Sundevall is given in the 'Œfversigt' of the Stockholm Academy; and as this work is often inaccessible to the working ornithologist, I reproduce his description here verbatim, merely adding that to the student of African ornithology the paper by the learned Professor is one of the highest interest, as it contains an account of Wahlberg's ornithological discoveries in Southern Africa. A set of the 'Œfversigt' is in the Society's library.

The following is Sundevall's description (*l. c.*):—

"HIRUNDO SPILODERA, n. sp. *Fusca, dorso cæruleo-nitido, albo vario; uropygio crissoque fulvis, gutture pectoreque antico fulvis nigro maculatis. Cauda fusca, immaculata, tantum leviter emarginata, pennis obtusis. Caudæ tectrices maximæ nigræ. Lora fulva. Nares rotundatæ. Ala* 112, *tars.* 12; *cauda* 58."

This, placed side by side with the diagnosis of *Hirundo alfredi*, leaves no doubt as to the identity of the two birds. The description given by me is taken from the afore-mentioned specimen in the Leyden Museum, which is a male from Caffraria (*Wahlberg*). Mr. Gurney is no douht right in supposing that the bird figured in the 'Ibis' is an adult; but the plate, obliterating as it does all trace of the peculiar striped appearance of the back, destroys the identity of the species.

In order to make assurance doubly sure, I wrote to my friend Dr. Tristram, who very kindly sent me for examination the type of *Hirundo alfredi*, so that I have now carefully examined the typical specimens of both *Hirundo spilodera* and *H. alfredi*, and am satisfied of the complete identity of the two species.

Genus 4. PHEDINA.

Phedina, Bonap. Riv. Contemp. Tor. 1857, p. 4 .. Type. *P. borbonica.*

Clavis specierum.

a. tectricibus subcaudalibus albis medio late brunneo striatis 1. *borbonica.*
b. tectricibus subcaudalibus fere omnino albis ..... 2. *madagascariensis.*

1. PHEDINA BORBONICA.

Hirondelle de l'île de Bourbon, Buff. Pl. Enl. 544. fig. 2.

Wheat-Swallow, Lath. Syn. ii. pt. 2. p. 581 (1783, ex Buff.).

Hirundo borbonica, Gm. Syst. Nat. i. p. 1017 (1788, ex Buff.); Lath. Ind. Orn. ii. p. 580 (1790); Gray, Gen. of B. i. p. 58 (1845); Schl. & Poll. Faun. Madag. Ois. p. 68 (1868); Gray, Hand-l. of B. i. p. 71 (1869).

Cotyle borbonica, Bonap. Consp. Gen. Av. i. p. 342 (1850).

Phedina borbonica, Bonap. Rivist. Contemp. Torin. 1857, p. 4; Newt. Ibis, 1861, p. 271; Maill. Notes Réun. p. 162 (1862); Newt. Ibis, 1862, p. 270, et 1863, p. 340; Coq. Alb. de la Réun. 1865, pp. 19, 20, fig. 2.

Above dark greyish brown, the centres of the feathers marked down the shaft with a narrow streak of black, very distinct on the rump; wing-coverts dark blackish brown; quills black above, greyish underneath; tail blackish brown above, dark brown beneath, paler on the inner web; lores black; cheeks, sides of the neck, and of the breast greyish brown, with darker shaft-stripes; rest of the under surface of the body white, longitudinally striped with dark brown, the upper part of the breast and flanks somewhat greyish; bill black; feet brown. Total length 5·4 inches, of wing 4·65, tail 2.

According to the late M. Coquerel, a variety of this bird is met with in Réunion; but Mr. Pollen has stated his opinion that this is but a stage of plumage of the ordinary species.

The description and measurements are taken from a specimen kindly lent me by Prof. Newton. It is a male procured by his brother (Mr. Edward Newton) in the Mauritius on the 18th of June, 1862. In the 'Ibis' for 1862 the last-named gentleman states that "since the hurricane of February 1861, which lasted for six days, he did not see a single specimen of *Phedina borbonica* in this island. They were never very numerous." Subsequently he writes (Ibis, 1863, p. 340), "I may here mention, with reference to my remark (Ibis, 1862, p. 270, note) that the hurricane of 1861 has not entirely exterminated this species in Mauritius, but it is certainly much rarer; for at the locality in the district of Savanne, where I have observed it to be most plentiful, I remained for ten days, in June 1862, and never observed more than three at once, and as they were always at the same place, they might have been the same individuals."

2. PHEDINA MADAGASCARIENSIS.

Phedina madagascariensis, Hartl. Faun. Madag. p. 27 (1861).

Phedina, sp., Roch & E. Newt. Ibis, 1862, p. 270; E. Newt. Ibis, 1863, p. 340.

Above rather pale brownish grey, the shafts of all the feathers being distinctly marked; wing-coverts and quills blackish brown, the latter paler underneath; tail dark brown, somewhat lighter on the inner webs; lores black; cheeks, sides of the neck, and breast greyish brown with darker shaft-stripes; rest of the under surface of the body white, with thin longitudinal stripes, the lower part of the abdomen and under tail-coverts pure white, the shafts of the feathers only indicated by a narrow line of brown; sides of the breast and flanks greyish brown; bill black; feet dark brown. Total length 5·5 inches, of wing 4·7, tail 0·2.

Hab. Madagascar (*Hartlaub*).

Dr. Hartlaub, in 1861, separated the *Phedina* from Madagascar as a distinct species, though no direct evidence had been received till recently to confirm this decision. Lately, however, I had the pleasure of receiving, in a small collection of birds sent from North Madagascar by Mr. Crossley, two specimens of this species; and the colour of these birds is certainly paler than in the Mauritius specimens, and the abdomen and under tail-coverts are nearly pure white. I therefore keep the two birds distinct; and it should be remembered that on both occasions of his visiting Madagascar Mr. Edward Newton saw a *Phedina* flying about which he believed to be distinct from the bird of Réunion, with which he was well acquainted.

Genus 5. COTYLE.

	Type.
Cotile, Boie, Isis, 1822, p. 550	*C. riparia.*
Biblis, Less.	

Clavis specierum.

a. torque pectorali.	
a'. tectricibus subalaribus brunneis	1. *riparia.*
b'. tectricibus subalaribus albis.	
a''. major: rectrice extima versus apicem alba	2. *eques.*
b''. minor: rectrice extima omnino brunnea	3. *cincta.*
b. torque pectorali nullo.	
a'. majores: rectricibus albo maculatis.	
a''. pectore superiore cum gula immaculata rufescentibus: subtus saturate nigricanti-brunnea	4. *fuligula.*
b''. gula alba vel pallide fulvescente.	
a'''. gula brunneo notata	5. *rupestris.*
b'''. gula albicante, immaculata	6. *obsoleta.*
b'. minor: rectricibus immaculatis	7. *paludicola.*

1. COTYLE RIPARIA.

Cotyle riparia (Linn.); Rüpp. Syst. Uebers. p. 22 (1845); Sclater, Contr. to Orn. 1852, p. 124; Müll. Journ. f. Orn. 1855, p. 5; Heugl. Syst. Uebers. p. 17 (1856); Heugl. Orn. N.-O. Afr. p. 165 (1869); Finsch & Hartl. Orn. Ost-Afr. p. 145.

Cotyle littoralis, Hempr. & Ehr. in Mus. Berol. (*teste Heuglin*).

Adult male. Above dark earthy brown, a little paler on the lower part of the back and upper tail-coverts; throat and cheeks white,

extending on to the sides of the neck; abdomen and under tail-coverts white; upper part of the breast, flanks, and under wing-coverts dark earthy brown, with a slight dash of grey; bill black; feet dark brown. Total length 5 inches, of wing 3·9, tail 1·9.

Young. Similar to the adult, but not such a deep brown, and having the wing-coverts, secondary quills, and lower part of the back edged with fulvous; the breast-band not nearly so dark as in the adult, and edged with grey, the brown colour not extending so distinctly on to the flanks, so that the greater part of the breast is white; bill black; feet dark brown. Total length 4·5 inches, wing 3·9, tail 1·7.

This, our well-known Sand-martin, only extends into North-eastern Africa. Dr. von Heuglin states that it is rather rare in N.E. Africa and Arabia.

2. COTYLE EQUES.

Cotyle eques, Hartl. P. Z. S. 1866, p. 325.
Hirundo torquata, Keul. Ned. Tidschr. iii. p. 384 (1866).

Hab. Ilha do Principe (*Dohrn, Keulemans*).

I have never seen a specimen of this bird, which, however, would seem to be distinct from *Cotyle cincta* by reason of the white spot on the outer tail-feather. Mr. Keulemans gives me the accompanying details respecting it:—

"I observed this species for several days in Prince's Island. The first time was in June, when I found a pair flying along the shores of the bay which is near the town of the island. They were very tame, and were continually resting on the twigs of some small tree or bush. This species did not seem to be very strong on the wing; for after flying up and down for a few moments, both birds repeatedly rested for some time. I shot one, which proved to be the female; but, judging from what I saw of the living birds, the male did not appear to differ in colour. I unfortunately did not secure the latter; for, immediately on the fall of his mate, he flew up high in the air and disappeared. In September I saw another individual sitting in exactly the same place where I had already killed the previous one, but I was obliged to abstain from shooting it, for fear of hitting some nigger boys who were in the neighbourhood. The call-note of this bird is like that of *Hirundo rustica*; but I did not hear any song. The present species is known to the inhabitants as an occasional visitor, and is called by some of them *Pascusha*, by others *Undurinha*. They also assert that it is found all through the year in the high mountains in the interior of the island, and comes sometimes to the shore."

3. COTYLE CINCTA.

Hirondelle brune à collier du Cap de Bonne Espérance, Buff. Pl. Enl. 723.
Hirundo cincta, Bodd. Tabl. Pl. Enl. p. 45 (1783, ex Buff.).
Cotyle cincta, Gray, Gen. of B. i. p. 60 (1845); *id.* Cat. Fiss. Brit. Mus. p. 30 (1848); Horsf. & Moore, Cat. B. Mus. E.-I. Co.

i. p. 97 (1854); Layard, B. of S. Afr. p. 58 (1867); Gurney, Ibis, 1868, p. 43; Heugl. Orn. N.-O. Afr. i. p. 164 (1869); Finsch & Hartl. Orn. Ostafr. p. 144 (1870); Blanf. Geol. & Zool. Abyss. p. 349 (1870).

Brown-collared Swallow, Lath. Gen. Syn. ii. p. 577.

Hirundo torquata, Gm. Syst. Nat. i. p. 1022 (1788); Lath. Ind. Orn. ii. p. 579 (1790); Bon. et Vieill. Enc. Méth. ii. p. 522 (1823).

Cotyle torquata, Rüpp. Syst. Uebers. p. 22 (1845); Bonap. Consp. Gen. Av. i. p. 342 (1850); Müll. J. f. O. 1855, p. 4; Heugl. Syst. Uebers. p. 17 (1856); *id.* Ibis, 1859, p. 339; *id.* Peterm. Mitth. 1861, p. 21.

Adult. Above greyish brown, darker on the head and paler on the rump, where the dark shafts of the feathers become plainer; quills dark brown, the secondaries edged at the tip with whitish, tail dark brown, narrowly margined with whitish, no spots on the inner webs; lores black; ear-coverts dark brown; a patch of feathers extending from the nostrils to the eye, throat, breast, under wing- and tail-coverts pure white; a band across the breast and thighs brown; bill black; feet dark brown; eye hazel. Total length 6 inches, of wing 4·8, tail 2·0.

Young. Similar to the adult, but has the plumage somewhat darker; rump very pale brown with a light rufous tinge; the whole of the upper surface, quills, and the band on the breast with rusty edgings to the feathers; bill dark horny brown; feet brown. Total length 6 inches, wing 4·7, tail 2·0.

Hab. N.E. Africa (*Rüppell, Heuglin*); Natal (*Mus. R. B. S.*); Cape Colony (*Layard*).

This species must stand as *Cotyle cincta* (Bodd.), as this name, founded on Buffon's 723rd plate, takes precedence over Gmelin's name of *torquata*, also founded on the same plate. The name of the latter, however, has generally been assigned by writers on North-eastern Africa to the Abyssinian bird, either by an oversight or from a supposition that it was distinct from the South-African form. I have had the opportunity of comparing an Abyssinian specimen with a series of skins in my collection from Natal and the Cape Colony, and I am unable to detect any characters whereby to distinguish them specifically. The Abyssinian bird is just a trifle larger, but in my opinion it cannot in any way be separated from the South-African species to which Boddaert's name is primarily referable.

The present species is distinguished from all the other Sand-martins (1) by its large size, (2) by the pure white under the wing-coverts. With the exception of this latter difference, it is a large edition of our Common Sand-martin (*Cotyle riparia*), of which it is the southern representative, as Mr. F. R. Surtees well remarked to me in one of his letters.

As regards its occurrence in N.E. Africa, Dr. von Heuglin writes as follows:—"This bird is a migrant in N.E. Africa. Rüppell found it in Barakit, I at Adowa, Mareb, Provinces of Dembea and Eifag, from early in May, through the rainy season, and in October at a marsh between Tedjura and Ghubet-harâb on the Adail coast."

4. COTYLE FULIGULA.

L'Hirondelle fauve, Levaill. Ois. d'Afr. v. p. 156, pl. 246.

Hirundo fuligula, Licht. in Forst. Descr. Anim. p. 55 (1844); Grill, Zool. Anteckn. p. 36 (1858).

Cotyle fuligula, Gray, Gen. of B. i. p. 60 (1845); *id.* Cat. Fiss. Brit. Mus. p. 29 (1848); Bonap. Consp. Gen. Av. i. p. 342 (1850); Cab. Mus. Hein. Th. i. p. 164 (1850); Cass. Cat. Hirund. Phil. Acad. p. 12 (1853); Sundev. Crit. om Levaill. p. 52 (1857); Müll. Journ. f. Orn. 1855, p. 5; Hartl. Orn. Westafr. p. 28 (1857); Hartl. Journ. f. Orn. 1861, p. 103; Layard, Birds of S. Afr. p. 57 (1867); Bocage, Jorn. Lisb. 1868, p. 40; Heugl. Orn. N.-O. Afr. i. p. 164 (1869); Gray, Hand-l. of B. i. p. 73 (1869).

Hirundo hyemalis, Forst. Descr. Anim. p. 55 (1844).

Above dark greyish brown, having a faint olive-green gloss in certain lights, paler on the rump and upper tail-coverts, the shafts of latter being distinctly marked; wing-coverts dark brown, with the same olive-green gloss as the back in some lights; quills dark brown, grey underneath; tail rather paler brown, all the feathers except the two centre ones having a conspicuous white spot on the inner web, this being exceedingly small or sometimes wanting altogether on the outermost rectrix; lores dark blackish brown; entire throat and breast deep fulvous; flanks and abdomen dark brown tinged with fulvous; under wing-coverts fulvous; bill and feet black. Total length 5·7 inches, wing 5·3, tail 2·0.

Hab. South Africa (*Layard*); Damara Land (*Andersson*); Angola (*Henderson*); Abyssinia (*Mus. Brit.*); Nubia (*Verreaux*).

When fully adult there is no mistaking this species, the deep fulvous throat, in some specimens quite rufous, and the general robust form of the bird being quite sufficient to distinguish it from all the African species of *Cotyle*. The absence of spots on the throat serve to separate it from *C. rupestris*, with which I have every reason to believe it has been confounded by some writers. In the Cape Colony it would appear to be not uncommon. I have a specimen in my collection, obtained by the late Mr. C. J. Andersson at Daviep in Damara Land; and it has been obtained by Signor Anchieta at Biballa.

There are certainly two distinct subspecies of the present bird, a northern and a southern form, the latter of course being the true *C. fuligula*. The British Museum also contains several specimens from N.E. Africa. But I cannot agree that the two forms from Southern and North-eastern Africa are positively identical. The Abyssinian subspecies is always smaller and darker. The following table gives the measurements of six specimens, amongst which are those of two birds in the British Museum from the last-named locality:—

				Total length.	Wing.	Tail.
1.	*Cotyle fuligula.*		Abyssinia.....	5·2	4·8	2·2
2.	,,	,,	,, ...	5·5	4·6	2·2
3.	,,	,,	South Africa	6·0	5·2	2·2
4.	,,	,,	,, ...	5·7	5·3	2·25
5.	,,	,,	,, ...	5·7	5·3	2·2
6.	,,	,,	Damara Land	5·8	5·0	2·25

Now, although there are evident differences in the two birds, I do not think it well to give a separate name to the northern bird, as there are already so many of these races in Africa which have received distinct appellations, and, as far as my experience goes, this practice has caused much confusion.

As I remark hereafter, I believe that Dr. Finsch was not quite correct in assigning a specimen brought home by Mr. Jesse from Abyssinia to the present species.

5. COTYLE RUPESTRIS.

Cotyle rupestris (Scop.); Brehm, Journ. f. Orn. 1853, p. 452; Müll. Journ. f. Orn. 1855, p. 5; Tristr. Ibis, 1867, p. 368; Heugl. Orn. N.-O. Afr. p. 163 (1869); Blanf. Zool. Abyss. p. 350 (1870).

Above pale greyish brown, darker on the head; wing-coverts and quills dark brown, showing in some lights a faint greenish gloss; tail very dark brown, the two middle and two outermost tail-feathers unspotted, the others with an oval white spot on the inner web; throat and breast buffy white, the former thickly marked with small spots of brown, the rest of the under surface of the body rather dark brown with a tinge of buff throughout; under wing- and tail-coverts very dark brown, edged at the tip with fulvous white; bill black; feet light brown. Total length 5·3 inches, wing 5·1, tail 1·8.

Hab. N.E. Africa. Rare in Egypt (*Brehm*); Abyssinia, Senafé (*Blanford*).

The above description is taken from a European specimen, and must not be too implicitly relied on for exact correspondence with the bird from North-eastern Africa. But I described a specimen of *true C. rupestris* advisedly, inasmuch as I am not convinced as to the absolute specific identity of the form occurring in Africa with that which occurs in Southern Europe. On the contrary, my belief is that, like *C. fuligula*, there are two subspecies of *C. rupestris*—one the true *C. rupestris* from Southern Europe, the other a diminutive subspecies, darker in plumage altogether, occurring in North-eastern Africa (*Blanford*), probably Egypt (*Adams*), Palestine certainly (*Tristram*), India probably (*Jerdon*, B. of Ind. i. p. 166), and certainly China (*Swinhoe*). The probability of the correct identification of the Indian and Egyptian birds depends on future observation; but I have myself examined specimens from the other localities. Mr. Blanford's Abyssinian bird, shot near Senafé, at an elevation of 7500 feet, belonged certainly to the small race of *C. rupestris*, and I could not distinguish it from others in the British Museum.

The bird which Dr. Finsch identified in Mr. Jesse's collection as *Cotyle fuligula* does not really belong to that bird or to its northern subspecies, but to the small race of *C. rupestris*. It has spots on the throat, and is exactly similar to a bird in Lord Walden's collection from Jericho. I very much question the occurrence of true *Cotyle fuligula* away from Southern Africa; and therefore I think that the bird thus named by Verreaux from Nubia (Hartl. J. f. O.

1861, p. 103) likewise belongs to the small dark-coloured subspecies of *C. rupestris*.

6. COTYLE OBSOLETA.

Cotyle obsoleta, Cab. Mus. Hein. Th. i. p. 50 (1850); Müll. Journ. f. Orn. 1855, p. 5; Hartm. Journ. f. Orn. 1863, p. 238; Gray, Hand-l. of B. i. p. 74 (1869).

Cotyle rupestris, Rüpp. Syst. Uebers. p. 22 (1845); Vierth. Nauman. 1855, p. 471; Heugl. Syst. Uebers. p. 17 (1856); Taylor, Ibis, 1859, p. 47; Heugl. Peterm. Mitth. 1861, p. 21; Adams, Ibis, 1864, p. 14; Hartm. Journ. f. Orn. 1864, p. 387.

Cotyle cahirica, Brehm, Journ. f. Orn. 1853, p. 163, et Extrah. p. 96.

Cotyle palustris, Tristr. Ibis, 1867, p. 363 (nec Steph.).

Cotyle paludibula, Tristr. Ibis, 1869, p. 437 (nec Rüpp.).

Above very pale greyish brown, dark on the head and nape; wing-coverts and quills darker brown, with light edgings to the feathers, these being narrow in adult, broad in young birds; rump and upper tail-coverts very pale greyish brown; tail-feathers light greyish brown, with a white spot on the inner web of all the feathers except the two middle and two outer rectrices; chin whitish, unspotted; throat and breast white with a very faint fulvous tinge; under tail-coverts darker greyish brown, with faint edgings of pale brown; under wing-coverts greyish brown mottled with white; bill dark brown; feet light brown. Total length 5 inches, wing 4·65, tail 1·75.

Hab. Resident in Egypt, Nubia, and Abyssinia, as also on the coast and Sinaitic mountains (*Heuglin*); Egypt (*Brehm*); Nubia, Fifth Cataract of the Nile (*Galton, spec. Mus. Brit.*); Syria (*Bartlett*); Palestine (*Tristram*).

I had already in my collection a Syrian specimen obtained by Mr. Edward Bartlett which I had noted as different from the usual *C. rupestris*; and after some research I found that it must be the *Cotyle obsoleta* of Cabanis from North-eastern Africa. This species is said to be exceedingly close to *C. rupestris*, but distinctly smaller and paler in colour. The underside from the chin to below the breast is almost pure white, the spots on the throat wanting; and the reddish blush is much more faintly developed, or is more or less absent altogether; hence the colour of the belly and vent appears more uniform with the colour of the breast. The white spots on the tail are smaller. This is a very good diagnosis indeed, and exactly illustrates the difference between *C. rupestris* and *C. obsoleta*.

The present bird appears to be the common Crag-martin of Egypt, and has been united by almost all writers on the ornithology of that country to the larger and darker-coloured *C. rupestris*. The latter species appears to be rare in Egypt, although it is noticed by Dr. Brehm, and is also probably the bird to which Dr. Leith Adams (*l. c.*) refers when he says:—"Some males are darker in plumage than others; this I noted particularly in one individual

shot in Upper Egypt." *Cotyle obsoleta* also occurs in Palestine, according to Dr. Tristram (*l. c.*), who, however, confounds it with *C. palustris*. More recently he refers again to the same subject (Ibis, 1869, p. 437), and, while admitting the distinctness of the bird in question from *C. rupestris* and *C. fuligula*, proposes to call it by Rüppell's name, *C. paludibula*.

Now it appears to me that the name *C. paludibula*, as it stands in the 'Systematische Uebersicht,' is nothing more than a misprint for *C. paludicola* (= *C. palustris*), which, though Dr. Tristram does not seem to be aware of the fact, occurs in North-eastern Africa, identical in form with true *C. paludicola* from South Africa. Again, Rüppell evidently refers to the last-named bird under the name of *paludibula*; for his *C. rupestris* is said to be "common in Egypt the whole year," which we know applies to *C. obsoleta*, but not to true *C. rupestris* (Scop.); and therefore his *C. paludibula* cannot be *C. obsoleta*. I have endeavoured to set the matter right in the list of synonyms given above.

7. COTYLE PALUDICOLA.

Hirondelle des Marais ou la Burnette, Levaill. Ois. d'Afr. v. p. 158, pl. 246. fig. 2 (1806).

Hirundo paludicola, Vieill. Nouv. Dict. 2de éd. xiv. p. 511 (1817); *id.* Enc. Méth. ii. p. 523. no. 19 (1823); Guérin in Ferr. et Gal. Voy. en Abyss. iii. p. 242 (1847); Des Murs, Voy. en Abyss. p. 79 (1847).

Cotyle paludicola, Sundev. om Levaill. p. 52 (1857); Grill, Zool. Anteckn. p. 36 (1858); Heugl. Ibis, 1859, p. 339; Kirk, Ibis, 1864, p. 320.

Cotyle paludibula, Rüpp. Neue Wirb. p. 106 (1835); *id.* Syst. Uebers. p. 22 (1845); Heugl. Syst. Uebers. p. 17 (1856).

Hirundo palustris, Steph. Gen. Zool. x. p. 101 (1817).

Cotyle palustris, Cab. Mus. Hein. Th. i. p. 49 (1850); Bonap. Consp. Gen. Av. i. p. 34 (1850); Müll. Journ. f. Orn. 1855, p. 5; Layard, Birds of S. Afr. p. 58 (1867); Gurney, Ibis, 1868, p. 464.

Above brown, with lighter edgings to the wing-coverts and secondaries; throat and breast greyish brown, sides of the body a little darker brown; under wing-coverts brown mixed with white; abdomen and under tail-coverts pure white. Total length 4·7 inches, wing 4·0, tail 2·1.

Young birds are a little more reddish in colour, and have the upper plumage mottled. I am indebted to the Rev. H. B. Tristram for the loan of a specimen of the curious variety of this Martin from the Transvaal territory. It has not a trace of white on the abdomen.

Hab. Abyssinia (*Mus. Berol.*); Transvaal (*Ayres*); Cape Colony (*Layard, Ayres*).

It is doubtful which name ought really to be applied to this species, viz. *paludicola* of Vieillot, or *palustris* of Stephens, both founded on Levaillant's plate, and both published in the year

1817. I prefer to retain that of Vieillot, as the names of this author are generally recognized for Levaillant's figures. I think Mr. George Robert Gray is wrong * in referring the bird called by Rüppell *C. paludibula* to *C. fuligula* (Licht.); for Rüppell distinctly quotes Levaillant's plate 158. fig. 2, not fig. 1, as being the same species. It is evident that he has written Vieillot's name from memory, and thus published it as *paludibula* instead of *paludicola*. He again writes in this way in the 'Syst. Ubersicht,' and Von Heuglin apparently copies the mistake.

8. COTYLE MINOR?

Cotyle minor, Cab. Mus. Hein. Th. i. p. 49 (1850).

Hab. North-eastern Africa (*Mus. Hein.*).

According to Dr. Cabanis this Martin approaches *C. riparia* and *C. palustris* in form and colour, but is larger than the former and smaller than the latter, and differs from both in the form of the tail, and also in the colour of the underside, as in this species both the grey breast-band and white throat are wanting. The chin and throat down to below the breast are yellowish grey.

I have now a specimen lying before me of what I take to be this species, brought from Abyssinia by Mr. Blanford, and I cannot see that it is really distinct from *Cotyle paludicola*. It appears to be identical with a Natal specimen of the latter in my own collection, with the exception of the length of the wing, which is longer in my Natal bird. I cannot perceive, even in the rather unsatisfactory diagnosis of Dr. Cabanis, any real characters whereby the species may be distinguished from *C. palustris*; but as I dislike to unite any species together without full evidence of their identity, I prefer to keep the present bird distinct, supposing that the Abyssinian specimen examined by me may, after all, not be the true *C. minor*, but *C. palustris*, which Dr. Cabanis also had in Heine's Museum from North-eastern Africa at the time he separated the former bird.

The specimen lent me by Mr. Blanford was shot by him on Lake Ashangi, where he informs me it was rare. The measurements are as follows:—

	Whole length.	Wing.	Tail.	Tarsus.	Middle toe.
1. *C. minor* (?) ..	4·5	3·9	1·7	0·3	0·4
2. *C. palustris* ..	4·6	4·0	2·0	0·3	0·4

Genus 6. WALDENIA.

	Type.
Waldenia, Sharpe, Ibis, 1869, p. 461	*W. nigrita*.

1. WALDENIA NIGRITA.

Hirundo nigrita, Gray, Gen. of B. pl. 20 (1845); *id.* Cat. Fiss. Brit. Mus. p. 27 (1848); Allen and Thomps. Exp. Niger, ii. p. 498 (1848); Cass. Cat. Hirund. Mus. Philad. Acad. p. 3 (1853);

* Cat. Fiss. Brit. Mus. p. 30.

Hartl. Journ. f. Orn. 1855, p. 360; Cass. Proc. Phil. Acad. 1859, p. 33; Du Chaillu, Eq. Afr. p. 472 (1862); Gray, Hand-l. of B. i. p. 71 (1869).

Atticora nigrita, Bonap. Consp. Gen. Av. i. p. 337 (1850); Hartl. Journ. f. Orn. 1853, p. 398; Müll. Journ. f. Orn. 1855, p. 3; Hartl. Orn. Westaf. p. 25 (1857).

Waldenia nigrita, Sharpe, Ibis, 1869, p. 461.

Above glossy purplish blue; chin dusky; throat white; rest of the under surface of the body purplish blue, but more dusky than the back; tail distinctly washed with dark blue above, underneath brownish black, the greater part of the inner web white; bill black; feet brown. Total length 4·5 inches; of bill from front 0·35, from gape 0·6; wing 4·3; tail 1·6; tarsus 0·35, middle toe 0·4, hind toe 0·2.

Young. Dusky purplish blue, the white throat-spot not quite so large, the tail square, or only slightly forked, and the white spots on the inner web oval and small.

Hab. Fantee (*Pel*); Rio Boutry (*Pel*); Calabar (*Mus. Paris*); R. Niger (*Thompson*); Camma River (*Du Chaillu*); Gaboon (*Mus. R. B. S.*).

The idea that this species ought to be generically separated was entertained long ago by the late Mr. Cassin, who wrote in 1859 as follows:—

"This fine species seems to indicate a distinct subgeneric group, having the bill and form of typical *Hirundo*, with a shorter tail. Its colour, too, pure black, with the throat white, is quite characteristic."

Genus 7. Hirundo.

	Type.
Hirundo, Linn. Syst. Nat. i. p. 343 (1766)	*H. rustica.*
Cecropis, Boie, Isis, 1826, p. 971.....	*H. capensis.*
Uromitrus, Bonap. Rivist. Contemp. Torino, 1857, p. 4.....	*H. filifera.*
Hemicecrops, Bonap. Rivist. Contemp. 1857, p. 4	*H. dimidiata.*
Lillia, Boie, Journ. f. Orn. 1858, p. 364.....	*H. rufula.*

Clavis specierum.

A. dorso postico et uropygio cæruleis.
  a. capite cæruleo: fronte rufa.
    a'. gula intense rufa.
      a''. majores: subcaudalibus rufis vel rufa tinctis.
        a'''. subtus alba, rufo tincta, caudæ maculis albis..... 1. *rustica.*
        b'''. subtus intense castanea, caudæ maculis fulvo tinctis..... 2. *riocouri.*
      b''. minores.
        c'''. subcaudalibus nigricanti-fuscis ... 3. *angolensis.*
        d'''. subcaudalibus purissime albis ... 4. *lucida.*
    b'. gula alba.
      c''. major: torque pectorali distincto ..... 5. *albigularis.*
      d''. minor: torque pectorali interrupto ..... 6. *æthiopica.*

b. capite toto cæruleo.
c'. subtus albæ.
e''. secundariis externe albis ..... 7. *leucosoma*.
f''. secundariis externe cæruleis, primariis concoloribus ..... 8. *dimidiata*.
d'. subtus cærulea ..... 9. *atrocærulea*.
c. capite toto pallide rufo ..... 10. *filifera*.
B. dorso postico et uropygio fuscis, capite fusco ..... 11. *griseopyga*.
C. dorso postico rufo, uropygio albescente..... 12. *rufula*.
D. dorso postico et uropygio rufis, concoloribus.
a. capite cæruleo.
a'. subtus albicantes.
a''. major: striis pectoralibus obsoletis ..... 13. *melanocrissa*.
b''. minor: striis pectoralibus distinctis .. ... 14. *domicella*.
b'. subtus rufæ.
c''. majores: gula albicante.
a'''. maculis caudalibus nullis ..... 15. *senegalensis*.
b'''. maculis caudalibus albis ..... 16. *monteiri*.
d''. minores: gula rufa.
c'''. coloribus intensioribus: torque nuchali rufo interrupto ..... 17. *semirufa*.
d'''. minor: torque nuchali nullo ..... 18. *gordoni*.
b. capite rufo.
a'. major: subtus tenuiter striolata ..... 19. *cucullata*.
b'. minor: subtus late striolata ..... 20. *puella*.

1. Hirundo rustica.

Hirundo rustica, Linn.; Jard. Ann. Nat. Hist. 1846, p. 86; Strickl. and Sclater, Contr. to Orn. 1852, p. 144; Müll. Journ. f. Orn. 1855, p. 4; Grill, Zool. Anteckn. p. 35 (1858); Hartl. Journ. f. Orn. 1861, p. 103; Heugl. Orn. N.-O. Afr. i. p. 151 (1869); Finsch & Hartl. Orn. Ost-Afr. p. 134 (1870).

Hirundo cahirica, Cass. Proc. Acad. Philad. 1859, p. 32.

Hab. North-Eastern Africa (*Heuglin*); Gold Coast (*Pel*); Old Calabar (*Jardine*); Gaboon (*Verreaux*); Camma River (*Du Chaillu*); Damara Land (*Andersson*); Cape Colony (*Layard, Surtees*); Natal (*Ayres*).

The few references given above are some not included in the otherwise very complete list of synonyms given by Dr. von Heuglin in his work on the Birds of North-Eastern Africa. To the account given by myself and Mr. Dresser (*antea*, p. 244) I cannot add any thing. I think, however, that there cannot be the slightest doubt that the bird supposed to be *Hirundo cahirica* by ornithologists, from Western Africa, is only *H. rustica* shot in full spring plumage on its way northwards.

2. Hirundo riocouri.

Hirundo riocouri, Sav. Descr. de l'Egypte, p. 270, pl. 4. fig. 4 (1813, descr. orig.); *id.* Descr. 2de éd. p. 339 (c. 1820); Cab. Mus. Hein. Th. i. p. 46 (1850); Sharpe and Dresser, P. Z. S. 1870, p. 247.

Cecropis riocouri, Boie, Isis, 1826, p. 971; Rüpp. Syst. Uebers. p. 22 (1845); Heugl. Syst. Uebers. p. 16 (1856).

Hirundo savignii, Steph. Gen. Zool. x. p. 90 (1817).

Hirundo cahirica, Licht. Verz. Doubl. p. 58 (1823); Gray, Gen.

of B. i. p. 57 (1845); Bonap. Consp. Gen. Av. i. p. 338 (1850); Cass. Cat. Hirund. Phil. Acad. p. 2(1852); Müll. Journ. f. Orn. 1855, p. 4; Bonap. Rivist. Contemp. Torin. 1857, p. 4; Cass. Proc. Acad. Philad. 1859, p. 33; Blas. Naum. 1859, p. 254; Hartl. Journ. f. Orn. 1861, p. 103; Tristr. Ibis, 1862, p. 278; Antin. Cat. Coll. Ucc. p. 26 (1865); Blyth, Ibis, 1866, pp. 237, 336; Gurney, Ibis, 1866, p. 423; Taylor, Ibis, 1867, pp. 56, 57; Tristr. Ibis, 1867, p. 361; Saunders, Ibis, 1869, p. 396; Heugl. Orn. N.-O. Afr. p. 152; Gray, Hand-l. of B. i. p. 68 (1869); Elwes and Buckl. Ibis, 1870, p. 200.

Hirundo boissoneauti, Temm. Man. d'Orn. iv. p. 652 (1840); Linderm. Vög. Griechenl. p. 119 (1860).

Cecropis boissoneauti, Brehm, Journ. f. Orn. 1853, p. 452.

Hirundo rustica, var. *orientalis*, Schl. Rev. Crit. p. xviii (1844); Adams, Ibis, 1864, p. 14.

Hirundo rustica, var. *savignii*, Bree, B. of Eur. iii. p. 170.

Above rather dull steel-blue; quills washed externally with dull greenish steel-blue; tail brownish black, glossed on the upper surface with dull greenish steel-blue, all the spots on the inner webs of the feathers pale buff; forehead chestnut; space between the bill and the eye black; throat and entire under surface chestnut; a broad band across the upper part of the breast dusky black, washed with steel-blue; bill black; feet dark brown. Total length 6·5 inches, wing 4·5, tail 3.

Hab. Egypt (*Taylor, Adams, et al.*); Palestine, on the coast (in the maritime plains) and throughout the length of the Jordan valley (*Tristram*); Nubia (*Rüppell*); ? Greece (*Lindermayer*); ? Constantinople (*Robson*).

The limited range which I allow to this species will doubtless be surprising to some ornithologists who are accustomed to believe that *H. riocouri* occurs and breeds with *H. rustica* in various portions of Europe, and, further, that it has occurred in England. Notwithstanding that it is in direct contradiction to the opinion of Professor Blasius, who is worthily considered one of our first authorities on European ornithology, I venture to suggest that *Hirundo riocouri* is strictly a South-eastern European bird, possessing a very limited range, and that all the specimens set down as this species which have occurred in Western Europe are nothing but the full spring plumage of *Hirundo rustica*. I have seen so many specimens marked in collections as the former bird which are nothing more than *H. rustica*, that I confess I require more positive evidence before I can bring myself to believe that *H. riocouri* occurs as other than an accidental visitor away from Egypt and Palestine. This being my conviction, I fear that Professor Blasius has been mistaken in supposing that it breeds regularly in Western Europe and pairs with *H. rustica*. Again, however, on the other hand, the learned Professor states that Mr. Olph-Galliard exhibited at a meeting in Cöthen a specimen of the supposed *H. riocouri* taken at St. Gothard; and he also states that he had received specimens from Europe as intense in colour as African skins (Naumannia, 1859, p. 254). As regards the

occurrence of the bird on the St. Gothard, it is just possible that a specimen may have been taken there, and that it may occur as an accidental visitor, since Mr. Howard Saunders (*l. c.*) has found an undoubted specimen of *H. riocouri* in the Museum at Catania. That the species is really an occasional migrant to the west, appears to me most probable, for the same reason that *Chettusia leucura*, another Egyptian bird, occurs in Malta; but I cannot but believe that the more common *Hirundo rustica* in the spring plumage, when the underparts are a very bright rust-colour, has often been mistaken for the true *H. riocouri*. If this really prove to be the case, the statement made by Professor Blasius, and reproduced by Dr. Bree, will require some modification. Its occurrence in Greece, where it is said to breed, appears to rest on pretty good authority; but I should like to see specimens from that country.

The types of Temminck's *H. boissoneauti* are stated by him to have come from Greece and Tripoli; and he gives the habitat of the bird as Andalucia and Greece, and probably the northern portion of Africa. I omitted to examine Temminck's types when at Leyden, but would suggest that, as in the case of the Tschagra Shrike (*Telephonus cucullatus*) the existence of the present species in Spain is imaginary.

In Mr. George Robert Gray's 'Genera,' and in Mr. Bree's 'Birds of Europe,' this bird is said to be the *Hirundo savignyi* of Leach. I cannot find the description. In Tuckey's Expedition to the Congo (p. 407), the present species is stated to have been procured, and is included on this authority in Dr. Hartlaub's work on the ornithology of Western Africa. I much question the correct identification of the specimens, and have not included Congo in my list of localities. Again, Mr. Cassin has stated that the Philadelphia Museum has a specimen from Monrovia, and also that Du Chaillu collected it on the River Camma. In both these instances I believe the full spring plumage of *H. rustica* to have been mistaken for *H. cahirica*.

In conclusion, I beg leave to assert that I by no means wish to *deny* the occurrence of *H. cahirica* in any of the localities mentioned by various authors, but that at present the evidence does not satisfy me. I shall, however, be the first to retract my views on receiving satisfactory information for the extension of the geographical distribution of this species of Swallow.

The bird from Eastern Siberia mentioned by Pallas (Zoogr. Ross.-As. i. p. 530), and suggested by Prof. Schlegel as being probably the present species (Rev. Crit. p. xviii.), is the *Hirundo horreorum* of North America, of which I have specimens in my collection from Lake Baikal.

3. Hirundo angolensis.

Hirundo angolensis, Bocage, Jorn. Acad. Lisb. 1868, p. 47; Sharpe, P. Z. S. 1869, p. 567, pl. xliii.; Bocage, Jorn. Acad. Lisb. 1869, p. 339.

Forehead, throat, and upper part of the breast deep brick-red; entire upper surface rich steel-blue, having a grèenish lustre in some lights; tail gradually forked, the two middle feathers steel-blue, the

whole of the inner web white, except a black border at the tip; a narrow interrupted band across the breast, below the red throat, steel-blue; rest of the breast and under tail-coverts ash-coloured, a little paler in the centre of the breast, the under tail-coverts washed with rufous, each feather margined with pale grey, and having a little heart-shaped blue mark before the end of the feather, the black shaft being also strongly defined; under wing-coverts dark ashy grey, washed on the edge of the wing with steel-blue; beak and legs black.

Hab. Angola: Huilla, Pungo-Andongo, Ambaca (*Anchieta*), Ambriz (*Monteiro*).

4. HIRUNDO LUCIDA.

Hirundo lucida, Verr. Journ. f. Orn. 1858, p. 42; Hartl. Journ. f. Orn. 1861, p. 103; Gray, Hand-l. of B. i. p. 68 (1869); Sharpe, P. Z. S. 1869, p. 567.

Above most brilliant steel-blue, inclining to indigo; wing-coverts dark blackish brown, glossed with steel-blue above, the innermost cubital feathers with a white spot on the inner web; tail deep steel-blue, all the feathers except the two middle ones for the most part pure white on the inner web, so that the tips and the part immediately edging the graduated extremity of the feather is black; a distinct though narrow frontlet and the entire throat deep brick-red; a band across the breast, below the red throat, bright steel-blue, broad at the sides and narrow in the centre of the breast; rest of the under surface of the body pure white, with a few dusky feathers on the flanks, and marked with narrow blue lines, more distinct in some specimens than in others; bill and feet black.

Hab. River Gambia (*Mus. R. B. S.*).

5. HIRUNDO ALBIGULARIS.

Hirundo albigularis, Strickl. Contr. Orn. 1849, p. 17, pl. 15.

Hirundo albigula, Bonap. Consp. Gen. Av. i. p. 338 (1850); Müll. Journ. f. Orn. 1855, p. 4; Gurney, Ibis, 1865, p. 264; Layard, Birds of S. Afr. p. 55 (1867); Gray, Hand-l. of B. i. p. 68 (1869).

Hirundo rufifrons, Less. Traité d'Orn. p. 268 (1831, nec Vieill.); Grill, Zoolog. Anteckn. p. 34 (1858).

Above deep purplish blue; quills dark blackish brown, with a faint gloss on the upper surface; the innermost cubital feathers marked on the interior web with a greyish white spot; tail blackish brown, the two centre feathers unspotted, but all the others marked on the inner web with a large patch of white; forehead deep chestnut; space between the bill and the eye and ear-coverts dusky black; throat, cheeks, and sides of the neck white; below the throat a broad band of purplish-blue feathers, broad at the sides and narrow in the centre of the breast; the rest of the under surface of the body dull white, greyish on the flanks; bill black; feet dark brown.

Hab. Cape Colony (*Layard*); Natal (*Ayres*).

6. HIRUNDO ÆTHIOPICA.

Hirundo æthiopica, Blanf. Ann. Nat. Hist. 1869, p. 329; Gray, Hand-l. of B. i. p. 401 (1869); Blanf. Zool. Abyss. p. 347 (1870).

Hirundo albigularis, Heugl. Orn. N.-O. Afr. p. 153 (1869).

Cecropis rufifrons, Vierth. Naum. 1853, p. 20; Brehm, Journ. f. Orn. 1853, p. 453, et Extrah. p. 96; Heugl. Syst. Uebers. p. 16 (1856); Vierth. Naum. 1857, p. 110; Brehm, Reise nach Habesch, p. 209 (1863).

Hirundo rufifrons, Des Murs in Lefebvr. Voy. in Abyss. Zool. p. 78 (1845); Heugl. Journ. f. Orn. 1861, p. 420, et 1863, p. 168; Hartm. Journ. f. Orn. 1864, p. 152.

Above purplish blue; forehead deep chestnut; lores sooty black; cheeks dull black, slightly glossed with purplish blue; quills brownish black, paler on the under surface, the upper surface glossed with dark greenish steel-blue; the inner cubital feathers marked with a whitish spot on the inner web; tail blackish brown, above glossed with dark greenish steel-blue, all but the two central feathers having an oblong white spot on the inner web; under surface pearly white, with a crescent-shaped mark of purplish blue feathers on each side of the upper part of the breast, not forming a complete band; under tail-coverts white, some of the shafts conspicuously indicated, and a small black spot on the outer web of some of the longest; bill black; feet dark brown. Total length 5 inches, wing 4·1, tail 2·5.

Hab. N. E. Africa (*Heuglin*, *Blanford*).

7. HIRUNDO LEUCOSOMA.

Hirundo leucosoma, Swains. Birds of W. Afr. ii. p. 74 (1837); Fras. P. Z. S. 1843, p. 51; Gray, Gen. of B. i. p. 58 (1845); *id.* Cat. Fiss. Brit. Mus. p. 24 (1848); Bonap. Consp. Gen. Av. i. p. 339 (1850); Hartl. Journ. f. Orn. 1853, p. 398; Müll. Journ. f. Orn. 1855, p. 4; Hartl. Orn. Westafr. p. 27 (1857), et Journ. f. Orn. 1861, p. 103; Sharpe, Ibis, 1869, p. 188; Gray, Hand-l. of B. i. p. 70 (1869).

Chelidon leucosoma, Boie, Isis, 1844, p. 171.

Hemicecrops leucosoma, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Above dark glossy blue; a white longitudinal bar on the wing, which is produced by the inner secondaries being for the most part broadly edged externally with pure white; tail graduated, dark blue above, dusky beneath, all the feathers except the two middle ones marked with white on the inner web, the exterior feathers having a large oval spot, which gradually gets smaller on the feathers as they approach the centre of the tail, till in the two next to the central feathers it is reduced to a small oval spot; entire under surface with the under wing- and tail-coverts pure white; bill and feet black. Total length 4·8 inches, of bill from front 0·3, from gape 0·45; wing 4·0; tail 1·8; tarsus 0·3; middle toe 0·4, hind toe 0·2, lateral toe 0·2.

Hab. Fantee (*Sharpe*); Accra (*Fraser*); Gaboon (*Verreaux*).

Swainson gives no definite locality for his specimen, though we may conclude it is from Senegal, like most of his other West-African birds. It does not seem to have occurred there, however, from the record of other collectors, and the three localities mentioned above are the only ones that can positively be depended upon.

It is a pretty little species, closely allied to *H. dimidiata*, Sund., with which Grill (Zool. Anteck. p. 36) seems to have confounded it; but it may always be distinguished by the conspicuous white alar bar, and the white on the tail.

8. HIRUNDO DIMIDIATA.

Hirundo dimidiata, Sundev. Œfv. Kongl. V. Ak. Stockh. 1850, p. 107; Hartl. Ibis, 1862, p. 144; Layard, B. of S. Afr. p. 56 (1867); Chapm. Trav. in S. Afr. ii. p. 410 (1868); Layard, Ibis, 1869, p. 72; Gray, Hand-l. of B. i. p. 71 (1869).

Hirundo scapularis, Cass. Proc. Acad. Phil. v. pl. 12 (1850); *id.* Cat. Hirund. Phil. Acad. p. 2 (1853).

Hemicecrops dimidiata, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Hemicecrops scapularis, Bonap. Rivist. Contemp. Torin. 1857, p. 4.

Hirundo leucosoma, Grill, Zool. Anteckn. p. 36 (1858, nec Sw.).

Adult. Above purplish blue; quills brownish black, grey on the inner web, the innermost of the greater wing-coverts white, forming a white spot, which, however, is generally concealed by the scapularies; occasionally in very old birds a small white spot also appears on the innermost secondaries; tail brownish black, without any spots, glossed on the upper surface with dark blue, with a faint greenish lustre; entire under surface silky white, having in some specimens a certain woolly appearance, greyish in certain lights; on each side of the upper part of the breast a patch of dark blue feathers; bill black, feet brown. Total length 5·5 inches, wing 4·2, tail 2·6, tarsus 0·4.

Young. Not nearly so bright above, and more distinctly tinged with greenish; the white spot on the greater wing-coverts either absent altogether, or, when present, of a dull greyish colour and very little developed.

Though belonging to the same section of the genus *Hirundo*; the present bird is certainly quite distinct from *H. leucosoma*, Sw., as it has no white on the tail-feathers, whereas the latter species has the greater part of the inner web white, as in *H. lucida*. We may regard these Swallows as showing a slight aberration from true *Hirundo* and inclining to *Waldenia*, which is also a short-tailed Swallow; and in its turn *Waldenia* leads to *Progne*.

The late Mr. Cassin named this bird *scapularis*; and from the figure given (*l. c.*) it would seem as if it really possessed white scapulars, but this is a misnomer; for on none of the true scapulars does this white appear. When I first began this paper I had very few specimens of *Hirundo dimidiata* for comparison; but through the kindness of Mr. Layard and Mr. Surtees I have recently had several in all stages of plumage from apparently the young bird, when no trace of the white patch can be discerned, up to the very old

bird, where the white patch is very fully developed. I was therefore nearly sure that Professor Sundevall's *H. dimidiata* and Mr. Cassin's *H. scapularis* were one and the same species in different stages of plumage; but as neither in the original description of Prof. Sundevall nor in that given by Mr. Layard (*l. c.*) is any mention made of this little white patch of feathers, I wrote to the former gentleman to ask him if the type specimens possessed the peculiarity. Every communication of Prof. Sundevall's is always read with great interest by ornithologists, so that I make no apology for giving his answer in his own words.

"Stockholm, Oct. 24, 1869.

"MY DEAR SIR,—With regard to your last letter (of Oct. 13th), I must mention that I have always considered the *Hirundo scapularis* of Cassin to be the same as my *H. dimidiata*. But in describing the bird I had only three specimens, two males and a female, from Port Natal, of which one went to Leyden in 1853 in exchange, and the other two (♂ ♀) are still here. Now these two specimens have the whitish mark on the wings so small and so well hidden by the scapulars that I had not observed it in the least; and probably it was the same in the third specimen; otherwise I should not have given it away. Afterwards (in 1857) I received another specimen, a male from the Knysna (Eastern Cape Colony), which has the white mark very large and apparent, but in the natural situation of the feathers it is perfectly hidden by the scapulars; and I do not believe this character will denote a specific difference, as it seems to me to be merely an individual variation. I have seen one more specimen from Knysna and one from Damara-land, which had both very conspicuous white marks. The species seems to be spread over the whole of Southern Africa (and probably breeds in the north); and if your specimens are from this quarter of the world, I think they will certainly be the above-named species. In my specimen from Knysna the white mark is a little greyish, and consists of the last two greater tectrices of each wing: the last is almost wholly whitish; the next has only the interior (dorsal) web whitish. Besides, the last little cubital feather (that is the last of the so-called tertiaries) is clouded with grey at the base, with a little white basal spot, which I do not observe in the Natal birds; this marking, however, is covered by the whitish tectrices. With regard to the Natal birds, there is a little difference in the extent of white in the two specimens. The mark is well-defined, and not at all as represented in Cassin's figure, where it is much too large and undefined. In my two specimens from Port Natal the marks are very small and greyish, only forming a spot on the inner web of the two mentioned feathers, and is a little different in the two birds. I think my name of *dimidiata* must be retained, as it is published in the April part of our 'Œfversigt' for 1850, Cassin's description being published in the June part of the Philadelphia 'Proceedings' of the same year. The same remark applies to my *H. holomelas* and his *A. hamigera*. To the description of the *H. dimidiata* I would add that the underside is tolerably pure white when seen directly or straight in front;

but seen a little from behind, it has a conspicuous greyish lustre, like that of a piece of silk.

"I am, &c.,

"C. J. SUNDEVALL."

To the above remarks of the learned Swedish Professor I do not think I can add any thing.

9. HIRUNDO ATROCÆRULEA.

Hirundo atrocærulea, Sund. Œfv. Kong. Vet. Akad. Förh. 1850, p. 107; Gurney, Ibis, 1863, p. 152; Layard, Birds, of S. Afr. p. 55 (1867); Gurney, Ibis, 1868, p. 152; Gray, Hand-l. of B. i. p. 70 (1869).

Entirely glossy blue-black, a little more dusky underneath; the shafts of the primaries and tail-feathers white and very plain on the underside; bill black; feet dark brown. Total length 7·2 inches; of bill from front 0·3, from gape 0·5; wing 4·5; tail 4·6; tarsus 0·35, middle toe 0·4, hind toe 0·2.

Hab. Lower Caffraria (*Wahlberg*); Natal (*Wahlberg, Ayres*).

Professor Sundevall considers this Swallow to be of the same form as *H. rustica*. I differ from him; for I think it comes nearest to *H. filifera*, which it greatly resembles in the extreme length and wire-like elongation of the outer tail-feathers. At any rate, it is one of the most remarkable Swallows yet known, and it is to be regretted that it is at present so rare in collections. My description and measurements are taken from a specimen collected by Wahlberg in Natal, received in exchange from the Stockholm Museum.

10. HIRUNDO FILIFERA.

Hirundo filifera, Steph.; Cab. Mus. Hein. Th. i. p. 46 (1850); Heugl. Journ. f. Orn. 1862, pp. 288, 298; Kirk, Ibis, 1864, p. 320; Heugl. Orn. N.-O. Afr. i. p. 155 (1869).

Ubromitrus filifera, Brehm, Reis. Habesch, p. 209 (1863).

Hirundo filicauda, Müll. Journ. f. Orn. 1855, p. 5.

Cecropis filicauda, Brehm, Journ. f. Orn. 1853, p. 452.

Cecropis filicaudata, Rüpp. Syst. Uebers. p. 22 (1845); Heugl. Syst. Uebers. p. 14 (1856); Antin. Cat. Ucc. p. 26 (1865).

Hirundo ruficeps, Licht. Verz. Doubl. p. 68 (1823); Ferr. et Gal. Voy. Abyss. Zool. iii. p. 242 (1847).

Hirundo smithii, Leach, App. to Tuckey, Voy. Congo, p. 407 (1818); Müll. Journ. f. Orn. 1855, p. 4; Hartl. Orn. Westafr. p. 26 (1857), et Journ. f. Orn. 1861, p. 103.

Hirundo fuscicapilla, Heugl. Orn. N.-O. Afr. p. 154 (1869).

Hirundo velocissima, Pr. Wurt. MS. (teste Heuglin).

Hirundo anchietæ, Bocage, Jorn. Lisb. 1867, p. 150 (descr. orig.) et p. 331.

Crown of the head bright chestnut; feathers before and round the eye dull black; ear-coverts, nape, and entire upper surface rich purplish blue; quills dark blackish brown, paler on the inner web, the upper surface glossed with deep steel-blue; tail black, the outer

web elongated and much attenuated, two centre feathers purplish blue, unspotted, the rest having a roundish white spot on the inner web; under surface white, faintly tinged with pink on the throat and upper part of the breast; a crescent-shaped patch of feathers on each side of the latter dull purplish blue; bill black; feet dark brown. Total length 5·7 inches, wing 4·3, tail 2·85.

Young. Crown dull brown; rest of the upper surface of the body brown, glossed with dull blue; tail quite square, or only slightly emarginate; underparts white, beautiful light pink on the throat and upper part of the breast.

Hab. Casamanze (*Leconte*); Chisalla Island, Congo (*Tuckey*); Benguela (*Anchieta*); Zambesi (*Kirk*); Dongola, Berber, Kordofan, Bahr-el-azrag, and Abyssinia between 2500 and 3000 feet altitude (*Heuglin*); Agula (*Blanford*).

Lord Walden considers that no differential characters can be found to separate the Indian and African examples of this species. As regards myself, I have not seen a sufficient number of specimens from Africa to warrant my giving a decisive answer on this point; but as far as my experience goes I am inclined to differ from his lordship.

I have examined several specimens from Africa, but have never met with any one so fine as those which we get from India; but on the other hand, I have seen Indian specimens not fully grown which it would be impossible to distinguish from the ordinary run of African specimens. The description and measurements are taken from a bird, apparently fully adult, from the Zambesi, in Lord Walden's collection. That of the young is taken from a specimen in the British Museum, collected by Livingstone at Tette.

11. HIRUNDO GRISEOPYGA.

Hirundo griseopyga, Sunder. Œfv. Kongl. V. Akad. Förh. Stockh. 1850, p. 107 (descr. orig.); Layard, B. of S. Afr. p. 55 (1867).

Atticora griseopyga, Heugl. Orn. N.-O. Afr. p. 149 (1869).

Atticora melbina, Verr. Rev. et Mag. de Zool. 1851, p. 310 (descr. orig.); Strickl. Contr. to Orn. 1851, p. 163; Hartl. Journ. f. Orn. 1853, p. 398; Müll. Journ. f. Orn. 1855, p. 3; Hartl. Orn. Westafr. p. 25 (1857); Cass. Proc. Phil. Acad. 1859, p. 33; Hartl. Journ. f. Orn. 1861, p. 103.

Hirundo melbina, Strickl. Contr. to Orn. 1851, p. 131.

Atticora cypseloides, Heugl. Journ. f. Orn. 1862, p. 297, et 1864, p. 276.

Entire head, lower part of back, and rump dull brownish grey; middle of the back and wing-coverts dark blue; quills brownish black glossed with dull blue; tail dull brown, glossed above with blue; lores black; a narrow line of feathers extending backwards over the eye whitish; cheeks and ear-coverts dull grey-brown; under surface of the body milky white, the sides of the upper part of the breast being greyish brown; bill and feet pale brown. Total length 5·8 inches, of wing 3·9, tail 3·3.

Hab. Natal (*Wahlberg*); Gaboon (*Verreaux*); Camma River (*Du Chaillu*); Cape Lopez (*Du Chaillu*); Abyssinia (*Heuglin*).

Of this rare bird I have only seen the single specimen in the British Museum, from which I have taken the above description. The nostrils being rather injured in this specimen, I can hardly give a decided opinion; but from what I could see, I am not at all sure that this species is a typical *Hirundo*. It seems likely that Drs. Finsch and Heuglin, who agree in uniting the West-African with the South-African bird, are right in this identification; but I cannot speak with certainty, as I have never seen specimens from both localities.

12. HIRUNDO RUFULA.

Hirundo rufula, Temm.; Brehm, Journ. f. Orn. 1853, p. 453.
Cecropis rufula, Vierth. Naum. 1855, p. 472.
Cecropis alpestris, Heugl. Syst. Uebers. p. 16 (1856).
Hirundo alpestris, Heugl. Orn. N.-O. Afr. i. p. 158 (1869); Blanf. Abyss. p. 346 (1870).

Head and upper part of the back rich purplish blue, with the usual white streaks on the top of the back; wing-coverts like the back, but slightly duller; quills blackish brown, grey on the inner web, the outer web glossed with dull purplish blue, having a slight greenish tinge; lower part of the back sienna, shading into very pale fulvous on the rump; upper tail-coverts rich purplish blue; tail blackish brown, glossed on the upper surface with purplish green; space between the bill and the eye pale fulvous; a narrow line of feathers extending backwards over the eye, ear-coverts, sides of the neck, and a collar encircling the neck sienna, very deep in some specimens; cheeks and entire under surface pale fulvous-white, covered with small longitudinal streaks marking the shaft of the feather, these streaks disappearing on the abdomen; the apical portion of the under tail-coverts purplish green; bill black; feet dark brown. Total length 7 inches, wing 4·8, tail 4·0.

Hab. Egypt (*Brehm*); Nubia (*Brehm*); Koomayli (*Blanford*).

This species is not included in Rüppell's list; but the above-mentioned authorities entitle it to a place in the avifauna of North-eastern Africa.

I prefer keeping this species under the name of *Hirundo rufula* of Temminck, inasmuch as there can then be no doubt as to the bird intended, and I am pretty certain that two distinct species have been confounded under the variously assigned names of *H. alpestris*, Pall., *H. daurica*, Linn., and *H. rufula*, Temm. I can by no means positively determine what the Swallow intended by the two first-named authors really is; but as no mention is made of the pale-coloured rump which forms so striking and important a feature in the bird now under consideration, I cannot consider it to be identical with Pallas's species. At the same time I have a specimen of *H. rufula*, identical with others from Palestine, in my collection from Dauria; but unless we receive positive information that no other Swallow, save *H. rufula*, is found in Dauria, whence came Pallas's type, we gain nothing; and until I am in possession of a larger series of these Cecropine Swallows to settle the matter, I prefer to employ Temminck's name, as then there can be no confusion.

13. HIRUNDO MELANOCRISSA.

Cecropis melanocrissus, Rüpp. Syst. Uebers. p. 22 (1845); Des Murs in Lefebvr. Voy. Abyss. Zool. p. 79 (1849); Müll. Journ. f. Orn. 1855, p. 5; Heugl. Syst. Uebers. p. 16 (1856).

Hirundo melanocrissa, Gray, Hand-l. of B. i. p. 69 (1869).

Hirundo rufula (pt.), Bonap. Consp. Gen. Av. i. p. 339 (1850).

Above deep indigo-blue glossed with purple, the usual white lines on the upper part of the back; feathers in front of the eye black; a narrow line of feathers from the base of the bill extending backwards over the eye, sides of the neck and round the nape and forming an interrupted nuchal collar deep sienna; rump paler sienna; quills brownish black, glossed with greenish steel-blue; upper tail-coverts deep steel-blue; tail-feathers brownish black, glossed with greenish above; cheeks and throat pale buffy white, the shafts of the feathers marked by small black lines; rest of the body buff, with faint marks; the apical end of the under tail-coverts glossy blue-black, having the appearance of a black crissum; bill black; feet dark brown. Total length 7 inches, of wing 4·7, tail 3·6.

Hab. North-Eastern Africa.

This species appears to be confined to North-Eastern Africa, where we learn from Dr. von Heuglin that it is found chiefly in pairs throughout the rainy season up to February in Central Abyssinia, both in the mountains and in the valleys. Mr. Blanford also procured it in Abyssinia.

Professor Barboza du Bocage must surely be mistaken in the locality (Cape-Verde Islands) assigned by him to a specimen in the Lisbon Museum. If really from the west coast of Africa at all, it would most likely be *H. domicella*.

The description and measurements are taken from a fine specimen procured at Undel Wells.

14. HIRUNDO DOMICELLA.

Hirundo domicella, Finsch & Hartl. Orn. Ostafr. p. 143 (1870); Heugl. Orn. N.-O. Afr. p. 159 (1869).

Hirundo melanocrissa, Hartl. Orn. Westafr. p. 27 (1857); Heugl. J. f. O. 1863, p. 168 (var.); Antin. Cat. Coll. Ucc. p. 25 (1865), nec Rüpp.

Head, back, and scapulars deep indigo; feathers in front of the eye black; a thin narrow line of bright rufous extending over this line to the eye; ear-coverts and sides of the neck rich rufous, extending round the neck and forming a narrow collar; the feathers on the upper back loose, so that a few of the margins show, giving a striped appearance; wing-coverts dull steel-blue; quills brownish, slightly glossed with dull steel-blue, paler on the under surface and on the inner edge of the secondaries; lower part of the back and rump uniform rich sienna; upper tail-coverts glossy steel-blue; tail forked, black above, paler beneath, glossed on the upper surface with greenish steel-blue; under surface of the body white, fulvous on the breast and abdomen, and marked on the breast with a

few very narrow black striæ; under tail-coverts glossy steel-blue; under wing-coverts white.

Hab. N.E. Africa (*Heuglin*); Casamanze (*Verreaux*); River Gambia (*Mus. R. B. S.*).

15. HIRUNDO SENEGALENSIS.

Hirondelle à ventre roux de Sénégale, Buff. Pl. Enl. 310.

Hirundo senegalensis, Linn. Syst. Nat. i. p. 345 (1766); Swains. B. of W. Afr. ii. pl. 6 (1837); Jard. Contr. to Orn. 1849, p. 4; Bonap. Consp. Gen. Av. i. p. 339 (1850); Hartl. Journ. f. Orn. 1853, p. 399; Heugl. Orn. N.-O. Afr. p. 156 (1869); Müll. Journ. f. Orn. 1855, p. 4; Hartl. Orn. Westafr. p. 27 (1857); *id.* J. f. O. 1861, p. 103; Gray, Hand-l. of B. i. p. 69 (1869).

Hirundo rufula, Gould, Birds of Eur. pl. 55 (1837, nec Temm.).

Cecropis senegalensis, Rüpp. Syst. Uebers. p. 22 (1845); Cass. Cat. Hirund. p. 3 (1853); Heugl. Syst. Uebers. p. 16 (1856).

Hirundo melanocrissus, Heugl. Journ. f. Orn. 1862, p. 297 (nec Rüpp.).

Above purplish blue; sides of the head and back of the neck, almost forming a nuchal cellar, as well as the entire rump, deep sienna; quills dull black, slightly glossed with blue; upper tail-coverts dull purplish blue; tail-feathers black, unspotted; throat and cheeks buffy white, as also are the under wing-coverts; rest of the underparts deep chestnut; bill black; feet very dark brown. Total length 9 inches, wing 5·7, tail 4·2.

Hab. Senegal (*Mus. Philad.*); River Gambia (*Mus. Brit.*); Casamanze (*Verreaux*); Fantee (*Gordon*); Ashantee (*Mus. Brit.*); N.E. Africa, up to 14° lat. (*Heuglin*).

16. HIRUNDO MONTEIRI.

Hirundo monteiri, Hartl. Ibis, 1862, p. 340, pl. 11; Gurney, Ibis, 1863, p. 116; Kirk, Ibis, 1864, p. 320; Gray, Hand-l. of B. i. p. 69 (1869); Bocage, Jorn. Acad. Lisb. ii. p. 40 (1868); *id.* 1869, p. 339; Finsch & Hartl. Orn. Ostafr. p. 139 (1870).

Male. Above glossy blue-black, the head capped and united to the nape by a broad interrupted band of blue-black feathers; a narrow line of feathers from the base of the nostrils to the eye dusky black; space below this line, and the base of the beak, cheeks, and ear-coverts, whitish, tinged with grey on the latter; lower part of the back and rump deep chestnut; upper tail-coverts blue-black; quills dusky brown, with a dark greenish-blue lustre on the upper surface; tail greenish blue above, blackish underneath, with an oblong white spot on the inner web of the exterior tail-feathers; throat and under wing-coverts white, tinged with light rufous; a triangular patch of feathers on the side of the head extending from the eye backwards, nearly encircling the head, and extending down the sides of the neck very bright rufous; shoulders and sides of the chest dark blue-black, like the back; breast and under tail-coverts deep rufous, with a black spot near the tip of the

two interior feathers of the latter; thighs white; bill black; feet dark brown.

Young. Above blue-black, but not so rich or so glossy as in the adult; quills and tail dusky brown, with scarcely any perceptible gloss on the upper surface; lower part of the back pale rufous; throat, cheeks, and under wing-coverts pure white; sides of the neck and breast rufous, but not so rich as in the adult; under tail-coverts rufous, the basal half of the two interior feathers black.

Hab. Angola, Massangano and Cambambe (*Monteiro*); Biballa (*Anchieta*); Ambaca (*Anchieta*); Damara-land (*Andersson*); Zambesi (*Kirk*).

This fine species was first discovered by Mr. Monteiro in Angola, and would seem to be by no means uncommon in Damara-land, whence several specimens were sent to Europe by the late Mr. C. J. Andersson, principally from the vicinity of Elephant Vley in that country. It has since been procured by Dr. Kirk in the Zambesi; and the description given above of the young bird is taken from a specimen sent home by him, and now in Lord Walden's collection.

17. HIRUNDO SEMIRUFA.

Hirundo semirufa, Sund. Œfv. Kong. Vet. Akad. Förh. 1850, p. 107; Sharpe, Ibis, 1869, p. 188; Ayres, Ibis, 1869, p. 290; Gray, Hand-l. of B. i. p. 69 (1869).

Above dark blue, inclining to indigo; rump chestnut; upper tail-coverts dark blue; quills black, brownish underneath, glossed above with dark blue; tail black glossed with blue above, every feather, except the two centre ones, having a very large white spot on the inner web; space between the bill and the eye velvety black; cheeks and ear-coverts deep blue-black; entire under surface chestnut, very deep on the flanks and abdomen; under wing-coverts fulvous; edge of the wing fulvous mottled with black; bill black; feet dark brown.

Hab. Natal (*Wahlberg, Mus. R. B. S.*); Transvaal (*Ayres*).

18. HIRUNDO GORDONI.

Hirundo melanocrissa, Jard. Contr. to Orn. 1849, p. 4 (nec Rüpp.).

Hirundo gordoni, Jard. Contr. to Orn. 1851, p. 141, et 1852, p. 47; Müll. Journ. f. Orn. 1855, p. 4; Hartl. Orn. Westafr. p. 27 (1857); *id.* Journ. f. Orn. 1861, p. 103; Sharpe, Ibis, 1869, p. 188.

Cecropis gordoni, Cass. Proc. Phil. Acad. 1859, p. 33.

Above glossy indigo-blue, duller on the wing-coverts; quills brownish black, glossed above, especially on the secondaries, with dark blue; rump sienna; upper tail-coverts dark indigo; tail brownish black washed with dull indigo above, the inner webs of all but the six central feathers having a large white patch; entire under surface sienna, a little paler on the throat, thighs, and under wing-coverts; bill black; feet dark brown. Total length 6·5 inches; wing 4·5; tail 4.

Hab. Gambia (*Mus. Brem.*); Fantee (*Gordon*); Abomey (*Fraser*); Ashantee (*Mus. Brit.*); Gaboon (*Verreaux*); Ogobai River (*Du Chaillu*).

19. HIRUNDO CUCULLATA.

Hirondelle à tête rousse du Cap de Bonne Espérance, Buff. Pl. Enl. 723. f. 2.

Hirundo cucullata, Bodd. Tabl. Pl. Enl. p. 45 (1783, ex Buff.); Gray, Gen. of B. i. p. 58 (1845); *id.* Cat. Fiss. Brit. Mus. p. 23 (1848); Müll. Journ. f. Orn. 1855, p. 4; Jard. Edinb. N. Phil. Journ. n. s. iii. p. 241 (1856); Gray, Hand-l. of B. i. p. 69 (1869); Heugl. Orn. N.-O. Afr. i. p. 162 (1869).

Hirundo capensis, Gm. Syst. Nat. i. p. 1019 (1788, ex Buff.); Bonap. Consp. Gen. Av. i. p. 339 (1850); Grill, Zool. Anteckn. p. 34 (1858); Layard, Birds of S. Afr. p. 54 (1867); Bocage, Jorn. Lisb. 1868, p. 47.

Cecropis capensis, Boie, Isis, 1826, p. 971; Cab. Mus. Hein. Th. i. p. 47 (1850).

Head intense sienna, the base of the feathers blue-black, showing occasionally a few markings of this on the crown; upper part of the back and scapulars brilliant steel-blue, on the extreme upper part at the back of the neck marked with white, this appearance being caused by the whitish edging of the feathers; wing-coverts deep steel-blue, the edge of the wing marked with white, especially on the primary coverts, which are all edged with white; quills brownish black, lighter on the inner web, washed exteriorly with dark greenish steel-blue; lower part of the back pale sienna, much paler on the upper tail-coverts, where it is nearly white, the outermost upper tail-coverts steel-blue; tail brownish black glossed with dark greenish steel-blue, the middle feathers without any white spot on the inner web, the next two on each side with a small white spot on the inner web, and so on till the last, which have a very large white spot; beneath fulvous white, the shaft of each feather strongly marked with brown, these shaft-stripes being very small on the throat and cheeks; the sides of the body washed with pale sienna; under tail-coverts white, with very distinct shaft-stripes. Total length 7·8 inches; of bill from front 0·35, from gape 0·5; wing 5·1; tail 4·1; tarsus 0·6; middle toe 0·5, hind toe 0·35.

Young. Head dark brownish sienna, very pale on the sides of the neck, the base of the feathers conspicuously showing, so that a quantity of blue-black diamond-shaped marks appear on the head; back and scapulars steel-blue, with the white edgings to the feathers showing conspicuously on the upper part of the back; wing-coverts dark blackish brown, edged at the tip with pale sienna; quills blackish brown glossed with deep greenish steel-blue, the secondaries tipped with pale sienna; rump pale sienna, the white edging to the rump not very distinct, the shafts of all the feathers clearly defined; the blue upper tail-coverts edged with sienna; tail dark blackish brown glossed above with deep greenish steel-blue, the outer feathers not very long, but having the white spot on the inner web very large as in the adult, decreasing in size as it approaches the two centre feathers, which are unspotted; under surface of the body white tinged with fulvous, deepest on the flanks and abdomen, the shafts

of the feathers very broad and plain, but thicker and not giving such a striped appearance in the adult; bill dark brown; legs flesh-colour.

Hab. Cape Colony (*Layard*); Natal (*Jardine*); Transvaal (*Ayres*); Mossamedes (*Sala, Mus. Lugd.*); Huilla (*Anchieta*).

20. HIRUNDO PUELLA.

Hirundo puella, Temm. in Faun. Japon. *Aves*, p. 33 (1842, descr. orig.); Heugl. Orn. N.-O. Afr. p. 160 (1869); Gray, Hand-l. of B. i. p. 69 (1869); Finsch & Hartl. Orn. Ostafr. p. 160 (1870).

Hirundo abyssinica, Guér. Rev. Zool. 1843, p. 322 (descr. orig.); *id.* in Ferr. et Gal. Voy. en Abyss. iii. p. 240, t. 10 (1847); Des Murs in Lefebvr. Voy. Abyss. Zool. p. 77 (1845); Gray, Gen. of B. i. p. 58 (1845); Bonap. Consp. Gen. Av. i. p. 340 (1850); Hartl. Journ. f. Orn. 1853, p. 399, et 1855, p. 360; Müll. Journ. f. Orn. 1855, p. 4; Hartl. Orn. Westafr. p. 28 (1857), et Journ. f. Orn. 1861, p. 103; Kirk, Ibis, 1864, p. 320.

Cecropis abyssinica, Cass. Cat. Hirund. Phil. Acad. p. 3 (1853); Brehm, Reise nach Habesch, p. 209 (1863).

Cecropis striolata, Rüpp. Syst. Uebers. p. 18, t. 6 (1845, descr. orig.).

Hirundo striolata, Gray, Cat. Fiss. Brit. Mus. p. 23 (1848); Jard. Contr. to Orn. 1848, p. 4; Horsf. & Moore, Cat. Birds Mus. E.-I. Co. i. p. 94 (1854).

Head and back of neck pale sienna; back and scapulars bright steel-blue; wing-coverts duller steel-blue; lower part of the back and rump deep sienna; quills brownish black, glossed with dull greenish blue; tail-feathers brownish black, glossed above with greenish steel-blue, all the feathers except the centre ones having a large white spot on the inner web; underneath fulvous-white, profusely marked with broad longitudinal stripes of dark brown; under wing-coverts deeper fulvous; bill black; feet dark brown.

Hab. North-Eastern Africa (*Heuglin*); Fantee (*Gordon*); Rio Boutry (*Pel*); Ashantee (*Mus. Brit.*).

Compared with *H. cucullata*, the present bird is much smaller and more slender, the head and rump are darker sienna, and the breast is much more thickly striped than in the southern species.

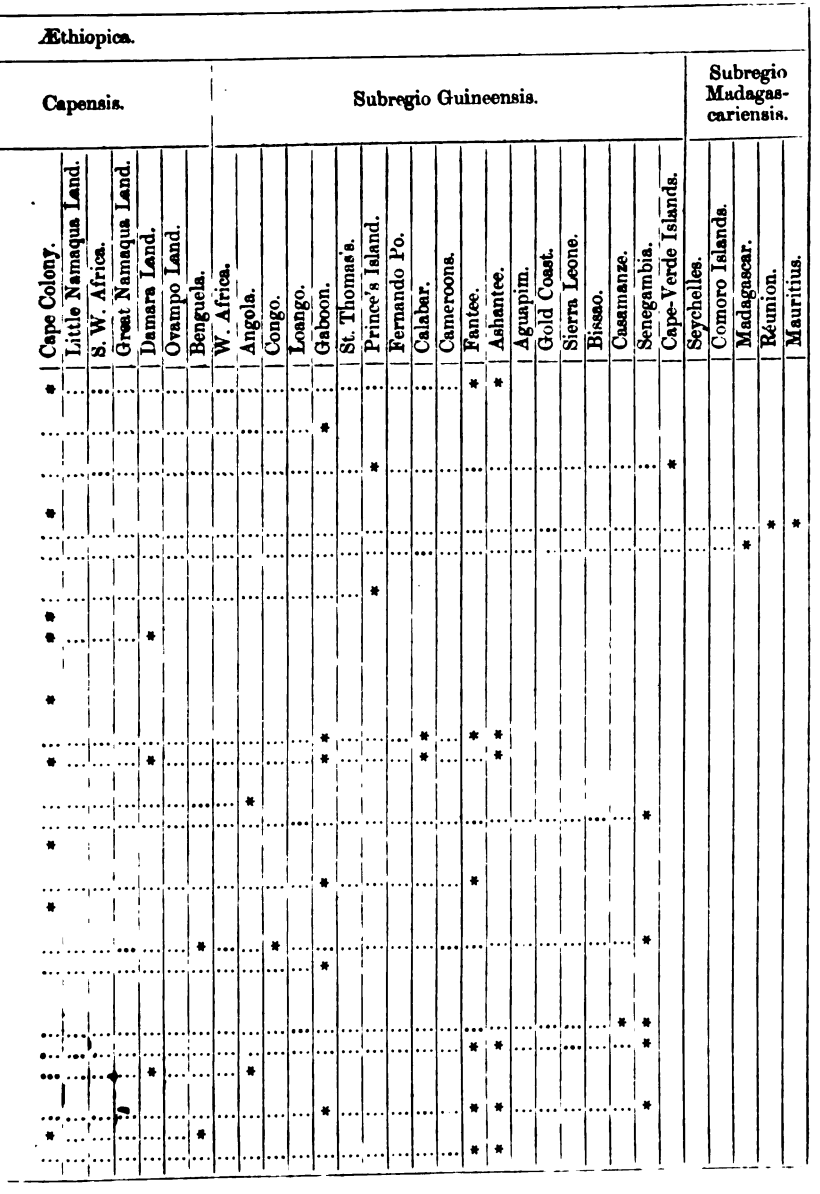
The Tables herewith appended will give some idea of the geographical distribution of Swallows throughout the Ethiopian region; and it is worth noting that the curious representation of a species by one or more subspecies or races, so well known to every student of African ornithology, was never more fully elucidated than in the genus *Hirundo* as exhibited throughout the Ethiopian region. Thus—

Hirundo albogularis	has its	representative	*H. æthiopica.*
H. dimidiata	,,	,,	,,	*H. leucosoma.*
H. melanocrissa	,,	,,	,,	*H. domicella.*
H. senegalensis	,,	,,	,,	*H. monteiri.*
H. semirufa	,,	,,	,,	*H. gordoni.*
H. cucullata	,,	,,	,,	*H. puella.*

Table showing the Geographical

	Regio																		
		Subregio Abyssinica.							Subregio Mosambicana.					Subregio					
	Egypt.	N.E. Africa.	Nubia.	Kordofan.	Bogos Land.	Senaar.	Abyssinia.	Somali Land.	E. Africa.	Melinda.	Zanzibar.	Mosambique.	Zambesi.	S. Africa.	Transvaal Republic.	Natal.	Caffraria.		
1. Psalidoprocne holomelæna																*			
2. —— pristoptera							*												
3. —— nitens																			
4. —— albiceps									*										
5. Chelidon urbica	*	*																	
6. —— albigena					*														
7. Petrochelidon spilodera															*				
8. Phedina borbonica																			
9. —— madagascariensis																			
10. Cotyle riparia	*	*																	
11. —— eques																			
12. —— cincta		*					*									*			
13. —— fuligula							*												
14. —— rupestris	*						*												
15. —— obsoleta	*		*				*												
16. —— paludicola							*								*				
17. —— minor		*																	
18. Waldenia nigrita																			
19. Hirundo rustica	*	*																	
20. —— riocouri	*		*																
21. —— angolensis																			
22. —— lucida																			
23. —— albigularis																*			
24. —— æthiopica		*	*				*												
25. —— leucosoma																			
26. —— dimidiata																*			
27. —— atrocærulea																*	*		
28. —— filifera				*			*						*						
29. —— griseopyga							*									*			
30. —— rufula		*					*												
31. —— melanocrissa							*												
32. —— domicella		*					*												
33. —— senegalensis		*																	
34. —— monteiri													*						
35. —— semirufa															*	*			
36. —— gordoni																			
37. —— cucullata															*	*			
38. —— puella		*					*												

Distribution of African Hirundinidæ.



4. Description of a new Species of Penguin. By Dr. O. Finsch, C.M.Z.S.

(Plate XXV.)

In a collection of birds received for inspection from the Counts Turati, of Milan, I was pleased to find a specimen of a Penguin, belonging to the genus *Dasyrhamphus*, which I take without hesitation to be a very fine and well-marked species. I propose to call this very interesting bird after the Count Ercole Turati, the proprietor of one of the richest and most extensive private collections in Europe.

Dasyrhamphus herculis, sp. nov.

All the upper surface, from the angle of the mouth along the sides of neck to the edge of the humerus, and along the sides of the body to the tibia dark slate-coloured; the shafts of the feathers glossy black; all the under surface, from the chin, silky white; upper surface of wing slate-coloured, somewhat paler than the back; the primaries and secondaries white, forming a narrow white edging; under surface of wing pure white, with an angulated dark streak at the base of the humerus; the lower mandible at base bordered with a narrow band of brownish slate; bill horn-black, with a pale reddish gony and edge of the basal portion of the upper mandible; feet dirty orange; claws horny black.

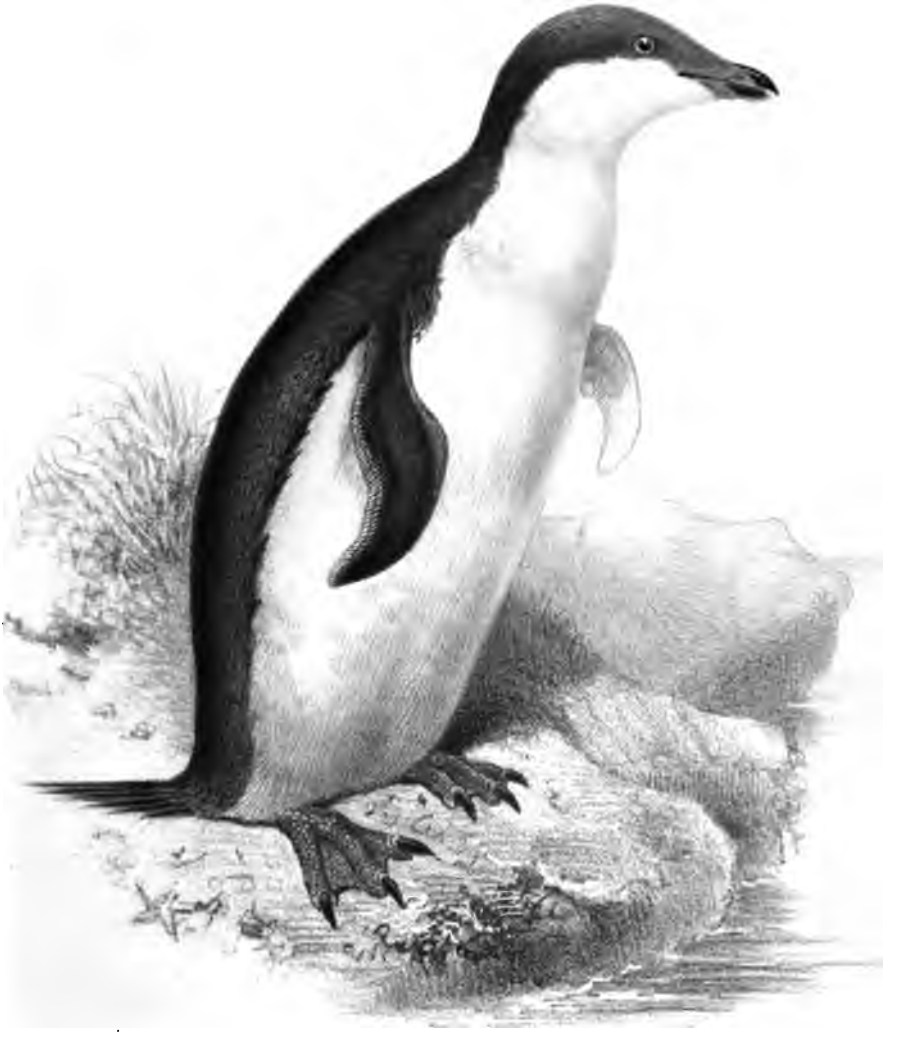
Long. tota 24″, alæ tot. 7″, caudæ 3″ 3‴, rostri a fronte 13½‴, a rictu 1″ 10‴, tarsi 15‴, dig. med. 1″ 9‴, ej. unguis 9‴, dig. int. 15‴, ej. unguis 8½‴, dig. ext. 1″ 7‴, ej. ung. 7½‴.

The exact locality of this Penguin is unknown; but there can be no doubt that it is from the Antarctic Seas.

This second species of a very interesting subgroup of the family Ptilopteri much resembles *D. adeliæ*, Hombr. & Jacq. (Voy. Pôle Sud, pl. 30; Gray, Ereb. & Terr. pl. 28), but is at once distinguishable by having the sides of the head, chin, and throat pure white; these parts being in *D. adeliæ* slaty blue, like the back. The British Museum also possesses a specimen of this white-throated species, as Mr. G. R. Gray kindly informs me, labelled *D. adeliæ*, jun.; but there can be scarcely any doubt of its being specifically distinct, the present bird showing no signs of being immature.

5. Characters of new Species of Birds collected by Dr. Habel in the Galapagos Islands. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A.

Dr. Habel, of New York, having placed in our hands for examination a collection of birds formed during a recent visit to the Galapagos, we lose no time in submitting to the Society the characters



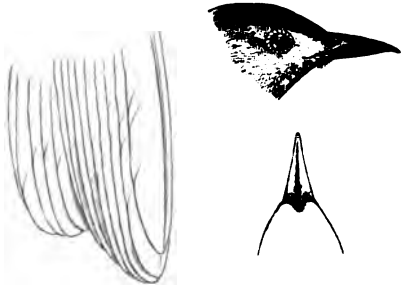
DACYRHAMPHUS HERCULES

of the new species which it contains, in order that Dr. Habel may have the credit of their discovery. We may state that we are preparing for publication a memoir on the avifauna of this group of islands, in which we propose to embrace what has previously been recorded on this subject, as well as the results of Dr. Habel's arduous investigations. We trust that this memoir will be deemed suitable for the Society's 'Transactions.'

In the meantime, however, to show the extent of Dr. Habel's collection, we add the subjoined summary of its contents, specifying under the head of each species the number of specimens obtained in each of the three islands in which birds were collected.

		Indefatigable Island.	Bindloes Island.	Abingdon Island.	Island uncertain.	Total number of specimens.
1.	Mimus melanotis, *Gould*.....	1	...	...	2	3
2.	Dendræca aureola, *Gould*	54	2	7	...	63
3.	Certhidea olivacea, *Gould*	17	...	...	1	18
4.	—— fusca, sp. n.	...	1	3	...	4
5.	Geospiza strenua, *Gould*	1	49	12	1	63
6.	—— fortis, *Gould*	23	16	4	2	45
7.	—— fuliginosa, *Gould*.....	28	...	...	5	33
8.	—— dentirostris, *Gould*	...	...	5	...	5
9.	—— parvula, *Gould*	...	10	29	...	39
10.	Camarhynchus variegatus, sp. n....	...	3	13	...	16
11.	—— habeli, sp. n.	...	3	4	...	7
12.	—— psittaculus, *Gould*	1	...	...	...	1
13.	—— prosthemelas, sp. n.....	3	...	...	...	3
14.	Cactornis scandens, *Gould*	33	...	...	...	33
15.	—— assimilis, *Gould*	...	3	...	...	3
16.	—— abingdoni, sp. n.	...	...	2	...	2
17.	—— pallida, sp. n.	2	...	...	...	2
18.	Pyrocephalus nanus, *Gould*	24	3	...	1	28
19.	Myiarchus magnirostris, *Gould* ...	16	1	1	1	19
20.	Craxirex galapagoensis, *Gould* ...	6	...	2	...	8
21.	Otus galapagoensis, *Gould*	6	...	...	...	6
22.	Strix punctatissima, *Gould*	1	...	...	1	2
23.	Zenaida galapagoensis, *Gould*.....	8	1	...	...	9
24.	Porzana spilonota, *Gould*	11	...	...	...	11
25.	Ægialitis semipalmata, *Bp*.....	3	...	...	1	4
26.	Hæmatopus palliatus, *Temm.*	3	...	...	...	3
27.	Strepsilas interpres, *Linn.*	5	1	...	...	6
28.	Himantopus nigricollis, *Vieill.* ...	2	...	...	...	2
29.	Tringa minutilla, *Vieill.*	2	...	...	...	2
30.	Calidris arenaria (*Linn.*)	...	1	...	...	1
31.	Totanus brevipes, *Vieill.*.....	1	...	1	...	2
32.	Numenius hudsonicus (*Lath.*).....	2	...	...	...	2
33.	Larus fuliginosus, *Gould*.....	2	...	1	...	3
34.	Ardea herodias, *Linn.*	5	...	...	...	5
35.	Nycticorax pauper, sp. n.....	2	...	...	...	2
36.	Butorides javanicus	2	...	...	...	2
37.	Dafila bahamensis (*Linn.*)	3	...	...	...	3
		267	94	84	15	460

Fig. 1.



Certhidea fusca.

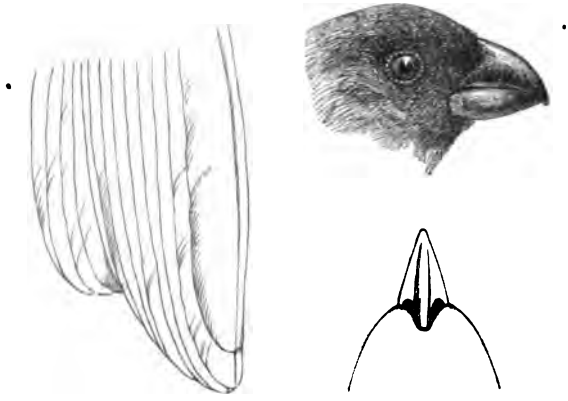
1. CERTHIDEA FUSCA, sp. nov.

Supra fusca, subtus grisescenti-albida: subalaribus et remigum marginibus internis albis: rostro et pedibus nigris: long. tota 3·7, *alæ* 2·0, *caudæ* 1·5, *rostri a rictu* 0·5, *tarsi* 0·8 *poll. Angl.*

Hab. Abingdon and Bindloes Islands, Galapagos archipelago.

Obs. Similis *C. olivaceæ*, sed rostro graciliore, colore, sicut pedum, nigro et veste magis fusca distinguenda.

Fig. 2.



Camarhynchus variegatus.

2. CAMARHYNCHUS VARIEGATUS, sp. nov.

Supra sordide olivacea fusco variegata, alis caudaque nigricantibus, remigibus extus anguste fusco marginatis: capite toto undique et corpore subtus ad medium pectus nigris: ventre sordide ochraceo in summa parte nigro variegato: rostro et

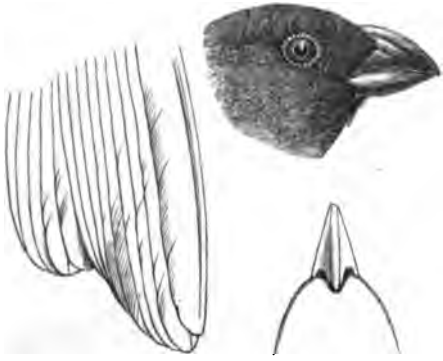
pedibus nigris : long. tota 5·5, *alæ* 3·3, *caudæ* 2·1, *rostri a rictu* 0·55, *tarsi* 1·1.

♀. *Supra fusca, subtus sordide ochracea, a mento usque ad ventrem nigricante frequenter variegata : rostro pallide corylino, pedibus nigris.*

Hab. Abingdon and Bindloes Islands.

Obs. Major quam *C. psittaculus* et capite nigro insignis, sed rostro, quoad formam, fere simili. Remiges secundus tertius et quartus fere æquales, et longissimi.

Fig. 3.



Camarhynchus habeli.

3. CAMARHYNCHUS HABELI, sp. nov.

Supra olivaceo-grisea : alis caudaque fuscis griseo marginatis : capite undique cum pectore toto nigris ; ventre lactescenti-albo : subalaribus et remigum marginibus internis albis : rostro valde compresso, culmine utrinque sulcato ; colore sicut pedum nigro : long. tota 5·6, *alæ* 2·8, *caudæ* 1·8, *rostri a rictu* 0·5, *tarsi* 0·9.

♀. *Grisea, subtus albida, capite nigro omnino carens.*

Hab. Abingdon and Bindloes Islands.

Obs. Præcedenti affinis, sed minor, et rostro magis compresso et maculis abdominis nullis.

4. CAMARHYNCHUS PROSTHEMELAS, sp. nov.

Supra niger : dorso olivaceo tincto : alis extus et cauda fuscis ; colore pallidiore limbatis : subtus niger, ventre toto pallide olivaceo : rostro rubello, pedibus fuscis.

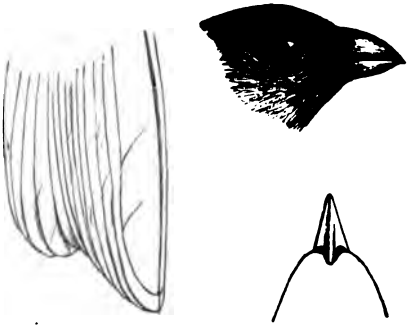
♀. *Supra olivaceo-fusca, alis caudaque saturate fuscis, illarum marginibus dilute fuscis : subtus ochraceo-albida : long. tota* 3·7, *alæ* 2·4, *caudæ* 1·5, *rostri a rictu* 0·4, *tarsi* 0·8.

Hab. Indefatigable Island.

Obs. Species parva, cujus feminam solam Habelus asportavit ;

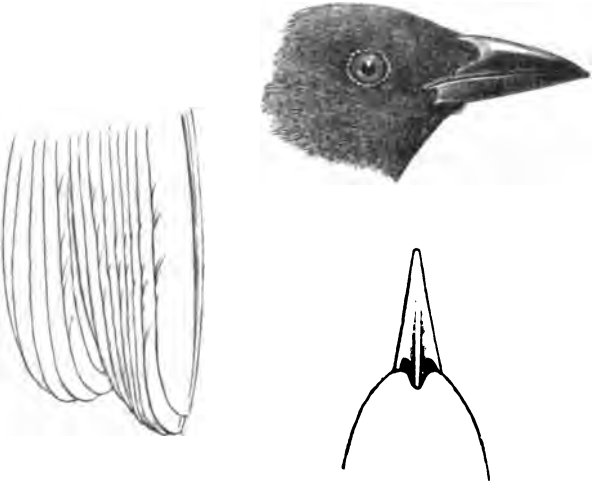
marem autem in Museo Britannico, ex itinere Darwiniano receptum, sed nunquam descriptum invenimus. Statura valde minore et rostro brevi et minus incurvo a præcedentibus distinguenda.

Fig. 4.



Camarhynchus prosthemelas.

Fig. 5.



Cactornis abingdoni.

5. CACTORNIS ABINGDONI, sp. nov.

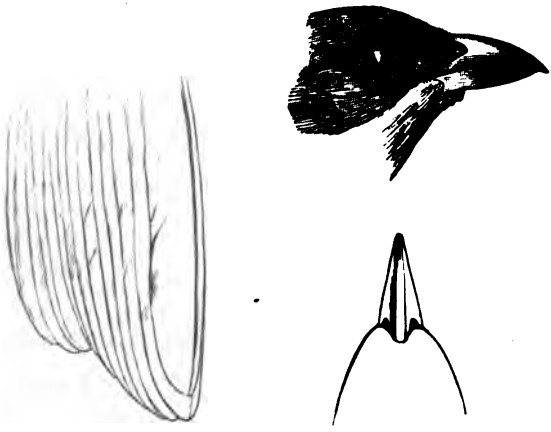
Fuscescenti-niger, alis caudaque nigris fusco anguste limbatis; subtus niger, ventre fuscescentiore et griseo variegato: tectricibus subalaribus nigricantibus: rostro elongato, incurvo, nigro:

pedibus obscure fuscis: long. tota 5·0, *alæ* 2·8, *caudæ* 1·6, *rostri a rictu* 0·8, *tarsi* 0·9.

Hab. Abingdon Island.

Obs. Proxima *C. scandenti*, sed rostro elongato, magis compresso, nigro differt.

Fig. 6.



Cactornis pallida.

6. CACTORNIS PALLIDA, sp. nov.

Supra olivaceo-fusca, alis caudaque obscure fuscis, dorsi colore anguste limbatis: subtus pallide ochracea: tectricibus subalaribus et remigum marginibus internis albis: rostro pallide corneo, pedibus nigris: long. tota 4·7, *alæ* 2·7, *caudæ* 1·7, *rostri a rictu* 0·65, *tarsi* 0·9.

Fem. *mari similis.*

Hab. Indefatigable Island.

Obs. Colore ab omnibus distincta, sed forsan avis haud adulta. Attamen mas et femina, specimina sola quæ nobis adsunt, vestitu omnino congruunt.

7. NYCTICORAX PAUPER, sp. nov.

Nycticorax violaceus, G. R. Gray, Zool. Voy. Beagle, iii. p. 128.

Similis N. violaceo, *sed omnino minor, et præcipue in dorso multum obscurior: dorsi plumis elongatis non, sicut in* N. violaceo, *griseo marginatis, sed saturate cinereo-nigris, unicoloribus: long. tota* 16, *alæ* 2·2, *caudæ* 4, *rostri a rictu* 3·2, *tarsi* 3·3.

Hab. Indefatigable Island.

Hujus *Nycticoracis* specimina duo sola, quorum neutrum adultum, habemus, sed ad speciem Americæ meridionalis vulgarem vix referenda esse censemus.

6. Notices of some new or little-known Species of South-American Birds. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

I beg leave to offer to the Society some remarks on new or rare American birds that have lately come before me, including the description of the fine new Woodpecker of the genus *Melanerpes*. The species of which I have to speak are four in number, namely :—

1. Thryothorus rufiventris.

Thryothorus rufiventris, Natt. MS.

Thryothorus galbraithi, Pelzeln, Orn. Bras. p. 47.

Murino-brunneus, uropygio rufescente lavato : alis extus et cauda nigro distincte transfasciatis ; superciliis elongatis, albis ; regione auriculari alba nigro striato : subtus gutture albo, abdomine rufescente, medialiter paulo dilutiore : long. tota 5·0, *alæ* 2·6, *caudæ* 1·7, *rostri a rictu* ·85 *poll. Angl.*

Hab. Brasil. prov. Goiaz et Matto-Grosso (*Natt.*).

Similis *T. longirostri*, sed rostro breviore, rectiore, et colore corporis supra minus rufescente distinguendus.

Herr von Pelzeln has referred this Wren, of which I have a single Nattererian specimen, received in exchange from the Imperial Cabinet, to *Thryothorus galbraithi* of Lawrence. But the latter bird, of which I possess several Panama examples, is in my opinion nothing more than a slight local form of *Thryothorus leucotis*, Lafr. (*T. albipectus* of my American Catalogue), a wide-ranging Guianan and Amazonian species. I have examined skins of it from Cayenne, the Island of Marajo, near Pará (*Wallace*), the Ucayali, Bogotá, and S. Martha, New Granada. I cannot distinguish between those from the last-named locality and Fraser's specimens from Western Ecuador and the Panama bird, upon which Mr. Lawrence's name *galbraithi* was founded, and regard the examples from all the localities above mentioned as referable to the same species.

Under these circumstances, I propose to restore to the present bird (which is wholly distinct from *T. leucotis*, and much more nearly allied to *T. longirostris*) the name by which it was designated in Natterer's MS.

2. Philydor consobrinus, sp. nov.

Supra brunneus, pileo toto cum fronte et cauda tota castaneo-rufis, pileo paulo obscuriore : alis nigricantibus, extus rufo, dorso fere concolori, marginatis, intus, præcipue ad basin, cum subalaribus pallidè castaneis : subtus magis dilute brunneus, lateraliter obscurior, in pectore et gutture medio dilutior : rostro nigricante, mandibula versus apicem corylina : pedibus fuscis : long. tota, 7·0, *alæ* 3·4, *caudæ rectr. ext.* 2·3, *med.* 3·1, *tarsi* 1·85, *rostri a rictu* 1·0.

Hab. in Nova Granada int.

This species is nearly allied to *P. columbianus*, Cab., and *P. panerythrus**, mihi, but is easily distinguishable from both these species by its dark chestnut-red cap. In *P. columbianus* the head above is greenish cinereous, with a definite pale brown superciliary stripe; in *P. panerythrus* it is olivaceous brown, like the back. In both the latter species also the wings are of a much brighter chestnut-red, and the colour below is more rufescent.

I have two skins of this *Philydor*, exactly similar, of the usual "Bogotá" make. I have had them for some time, but have never been able to find a name for them. There is a third specimen in the collection of Messrs. Salvin and Godman.

This bird is also not unlike *P. turdinus* of Von Pelzeln in general colour, but is again distinguishable by its rufous head.

3. CHÆTURA BRACHYCERCA, Scl. et. Salv. P. Z. S. 1867, p. 758, pl. xxxiv.

Since our publication of the description of this *Chætura*, Mr. Salvin has obtained an undoubtedly Cayenne skin of the same species. This has led me to refer again to Buffon's figure of his *Hirondelle à queue pointue de la Lousiane* (Pl. Enl. 726. fig. 2), upon which Temminck (Tableau Méthodique, p. 78) established his *Cypselus poliurus*. I have also carefully re-examined a typical specimen of *Acanthylis brachyura*, Jardine, in my own collection, and have come to the conclusion that all these synonyms are referable to one species. But the Brazilian bird, which I have hitherto referred to *Cypselus poliurus* of Temminck, is quite different, and may be called *cinereicauda*—*Acanthylis cinereicauda*, Cassin, being the earliest synonym *certainly*† referable to it.

These two species will therefore now stand as follows:—

(1) CHÆTURA POLIURA.

Hirondelle à queue pointue de la Lousiane, Buff. Pl. Enl. 726. fig. 2.
Cypselus poliurus, Temm. Tabl. Méth. p. 78.
Acanthylis brachyura, Jard. Ann. N. H. ser. 1, vol. xviii. p. 120.
Chætura brachycerca, Scl. et Salv. P. Z. S. 1867, p. 758, pl. xxxiv.
Hab. Amazonia, Xeberos (*Bartlett*); Cayenne (*Mus. S.-G.*); Tobago (*Jardine*); Trinidad (*Finsch*).

Dr. Finsch informs me that he has lately received a skin of this species in a collection from Trinidad.

(2) CHÆTURA CINEREICAUDA.

? *Vencejillo*, Azara, Apunt. ii. p. 513.
? *Hirundo oxyura*, Vieill. N. D. xiv. p. 473, et E. M. p. 331.
Cypselus pelasgius, Max. Beitr. iii. p. 347.

* *Philydor panerythrus*, mihi, P. Z. S. 1862, p. 110, was erroneously termed *semirufus* in the Supplement to my American Catalogue, p. 360. I cannot distinguish it from the Costa-Rican skins which Mr. Salvin refers to *Automolus rufescens*, Lawr. Ann. L. N. Y. viii. p. 345.

† If Azara's "*Vencejillo*," Apunt. ii. p. 513, be proved to be the same as the Brazilian bird, an older name will be *oxyura* of Vieillot.

Acanthylis cinereicauda, Cassin, Pr. Ac. Sc. Phil. v. p. 58, pl. 13. fig. 2 (1858).

Acanthylis oxyura, Burm. Syst. Ueb. ii. p. 366.

Chætura poliura, Sclater, Cat. A. B. p. 283, P. Z. S. 1863, p. 101, et 1865, p. 611; Pelzeln, Orn. Bras. p. 16.

Hab. Wood-region of S.E. Brazil (*Max. et Burm.*), Prov. S. Paulo and Matto-Grosso (*Natterer*).

Although these two birds have been confounded under one name, through the difficulty of recognizing Buffon's bad figure, they are very easily distinguishable upon comparison.

The second species has a much longer tail, and is cinereous below instead of sooty black with slight bronzy reflections.

4. MELANERPES PULCHER, sp. nov.

Niger, fronte lata alba, flavicante tincta, pileo supero toto et nucha coccineis: capitis lateribus nigris: dorsi linea media et uropygio albis; alarum plumis omnibus in pogonio interno albo transfasciatis: cauda nigra, rectricum pogoniis internis albo punctatis: subtus griseus, a pectore ad ventrem imum albo nigroque transfasciolatis; plaga ventrali media coccinea: subalaribus albis nigro maculatis: rostro et pedibus nigris: long. tota 7·0, *alæ* 4·2, *caudæ* 2·3, *rostri a rictu* 1·2.

Fem. *Pileo nigro et nucha coccinea flavo marginata differt.*

Hab. in rep. Columbiana, prope Bogotá.

Obs. Proximus *M. chrysaucheni* Salvini, sed pileo maris coccineo, feminæ nigro, et corpore subtus a crisso usque ad summum pectus transfasciato differt.

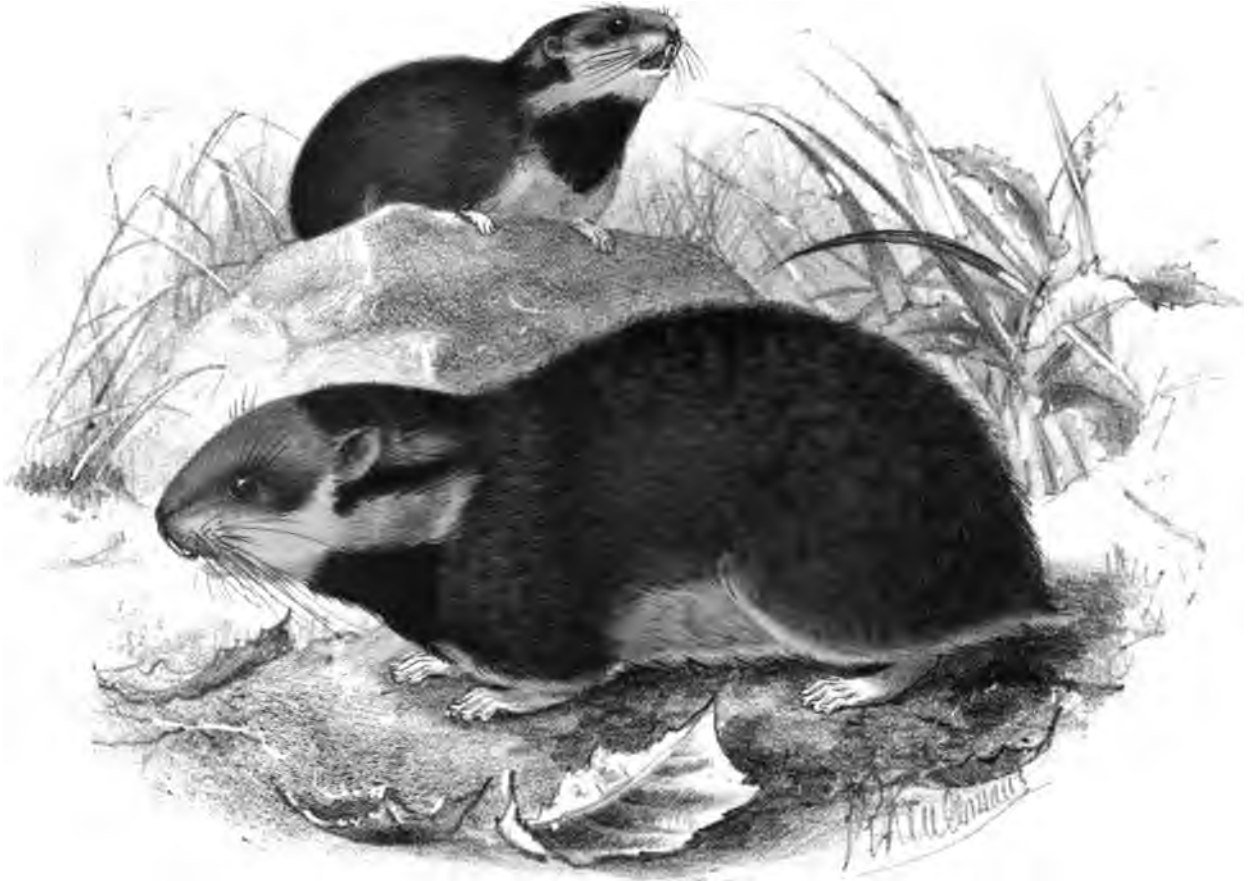
I have lately purchased a pair of this fine new Woodpecker in Paris; and Mr. Salvin has a female from the same dealer. They are all "Bogotá" skins.

The species is a near ally of the *Melanerpes chrysauchen* from Veragua, lately described by Mr. Salvin *, but differs as above mentioned. It is somewhat doubtful, perhaps, whether it should be placed in the genus *Melanerpes* or *Centurus*, which are certainly closely allied; but as Mr. Salvin has referred his species to the former genus, I have followed his lead. It may be remarked that in all the typical *Centuri* the wings are banded externally, whereas in these, as in other species of *Melanerpes*, they are uniform.

7. Additional Note on a Specimen of the Common Fin-whale (*Physalus antiquorum*, Gray; *Balænoptera musculus*, auct.) stranded in Langston Harbour, Nov. 1869. By W. H. FLOWER, F.R.S., V.P.Z.S., &c.

In a notice of this animal, published in the 'Proceedings' of the Society for 1869, p. 604, the external characters alone are described. Having recently had an opportunity of examining some of the bones,

* *Anteà*, p. 213.



W. & N. Hanhart imp.

SPICELUS AMERICANUS.

I am enabled to add that the diagnosis then made of the species is quite confirmed, and that the specimen was very nearly, but not quite, adult, the epiphyses of the bodies of the vertebræ having become united throughout the caudal and the greater part of the lumbar, but not in the thoracic and cervical regions. The transverse processes of the cervical vertebræ, from the second to the sixth inclusive, are joined at their extremities, so as to form complete rings. The seventh has no inferior process. There are fifteen pairs of ribs; the first with a very short capitular process, the second and third with long capitular processes; the fifteenth rudimentary on both sides, as in the skeleton now in the Alexandra Park. The sternum is in the form of a short broad cross, the xiphoid process being less developed than usual; its greatest breadth is 23 inches, its length 15½ inches.

The skeleton belongs to Mr. D. Harris, of the "Museum Gardens," near Kingston Church, Portsea, where, when the preparation of the bones is completed, it is to be mounted and exhibited.

8. On *Cricetus nigricans* as a European Species.

By Alfred Newton, M.A., V.P.Z.S., &c.

(Plate XXVI.)

The skin of a small Rodent, brought from Turkey in Europe, and lately presented to the Museum of the University of Cambridge by Mr. Thomas Edward Buckley, B.A., of Trinity College, and a Fellow of this Society, was clearly of a species not generally included as a member of the European fauna by writers who have made that subject their especial study. My friend Mr. Edward Alston, who has paid particular attention to the smaller mammals, on the specimen being shown to him, speedily recognized in it the *Cricetus nigricans* of Brandt; but as he arrived at this conclusion only from the description given in Wagner's Supplement to Schreber's great work *, and as, so far as I know, no other examples of the species exist in this country, I thought it safest to forward the specimen to Professor Peters, who has kindly informed me that, except being brighter in colour, he did not find the least difference between it and types of that species in the Berlin Museum. I accordingly now have the pleasure of exhibiting the specimen and of offering a few remarks on the species.

Cricetus nigricans, Brandt, was first described, in 1832, by Ménétriés, in his well-known 'Catalogue'†, as having been procured by him on the mountains of the Caucasus. In a review of this work, three years later, Dr. Gloger ‡ expressed his opinion that it was not

* Die Säugethiere u. s. w. von Schreber, Supplementband, iii. p. 451. Erlangen: 1843.

† Catalogue raisonné des objets de zoologie recueillies dans une Voyage au Caucase, &c. p. 22. St. Pétersbourg: 1832.

‡ Jahrbücher für wissenschaftliche Kritik, No. 88 (May 1835) pp. 718, 719.

a good species, identifying it with the black variety of the Common Hamster, *Cricetus vulgaris*, Desm., mentioned by several authors, and among them by Pallas, who (Zoogr. R.-As. i. pp. 161, 162) says of Caucasian examples, "corpus subtus sæpe griseo-contaminatum et maculæ laterales ad collum minus evidenter albæ." Upon this, in the following year, Prof. Brandt communicated to the Academy of Sciences of St. Petersburg a fuller description of the animal*, maintaining its specific validity and promising a figure of it, which, though spoken of four years later by Prof. von Nordmann†, was, I suspect, never published. This naturalist adds that the species (the value of which he does not question) lives also "sur les montagnes de l'Awhasie" [Abasia]. About the same time Drs. Keyserling and Blasius included the species in their excellent book‡, but did not increase our knowledge of it. Three years later, Wagner, in the work already mentioned, recognized it without doubt as a good species; and the matter, if even then questionable, must be considered to have been finally set at rest by a subsequent contribution, in 1854, from Prof. Brandt to the St. Petersburg Academy, wherein § he described and showed by figures the cranial and dental differences existing between *C. nigricans* and *C. vulgaris*.

The validity of the species being thus finally established, I think its occurrence so far to the westward of any previously recorded *habitat* may interest some members of the Society. I have only to add that Mr. Buckley informs me that his example was "one of a pair killed on the 27th of April, 1869, in a corn-field (the corn being about four inches high) at Shitangik, a station on the Varna and Rustchuk railway, in Bulgaria," and that "the animals were very slow in their movements."

May 26, 1870.

G. R. Waterhouse, Esq., V.P., in the Chair.

A fourth letter‖ on the ornithology of Buenos Ayres, addressed to the Secretary by Mr. W. H. Hudson, C.M.Z.S., was read:—

"Buenos Ayres,
"March 17, 1870.

"My dear Sir,—On the 9th of this month we were visited by a terrible storm, which lasted three days, a cold and violent south-west wind prevailing. After it had subsided, I could not but notice

* Bull. Acad. Sc. St. Pétersbourg, i. (1836) p. 42.
† Voy. Démidoff, Zoologie, i. p. 42. Paris: 1840.
‡ Wirbelth. Eur. (Braunschweig, 1840), pp. ix, 35.
§ Bull. Phys. Math. Acad. Sc. St. Pétersbourg, xiv. (1854) pp. 182–184.
‖ See *antea*, p. 158.

the effects it had had on the migration of our summer and winter birds. All the species of Plover had disappeared, with the exception of a few individuals; and these were so bruised by the wind that they could hardly raise themselves from the ground. Most of the small birds had also disappeared before their usual time of departure; but of some species the young remained.

"Storms and other sudden changes in the temperature are probably the immediate causes of migration in most of the birds that visit the Pampas. Those that are very regular in their coming and going—such as the Currincha (*Pyrocephalus rubineus*), the Summer Redbreast (*Leistes superciliaris*), the Tijereta (*Milvulus violentus*), one of our Swallows, the Humming-birds, and a few others—are the latest to appear, and the earliest to depart.

"In the others, the irregularity in the time of migration is the greater the longer the species remains with us—it being, perhaps, greatest in the common Blackbird (*Molothrus bonariensis*), which sometimes remains all winter and sometimes leaves us early in autumn. The Asquita (*Centrites niger*) and the *Cinclodes fuscus* are almost the first winter birds to appear; but I have not yet seen one individual of either of these species, while some usually late comers, such as *Thinocorus rumicivorus* and *Tænioptera variegata*, are plentiful since the storm. The last species has appeared in such numbers that I saw more individuals during an hour's ride a few days ago than I usually see in the course of an entire winter.

"*Tænioptera variegata* is one of the most interesting of the Patagonian birds that visit us in this season, or, indeed, of all the true Pampas birds. The other species of the genus or subgenus to which this bird belongs, the *Tæniopteræ irrupero*, *coronata*, and *dominicana*, in every thing closely resemble each other. But *T. variegata*, although, in structure, it has a general resemblance to these, and also possesses their melancholy, whistling note and rapid, graceful flight, in some respects differs from them very materially. It is somewhat larger, has a straighter bill, more pointed wings; and its prevailing colour is chocolate, instead of white. It does not quietly watch for its food nor hop on the ground like the *T. dominicana*, but, like the Plover, runs rapidly along the ground in search of insects. Unlike the others, this *Tænioptera* is also sociable, quarrelsome, and sportive in its habits, frequently chasing its fellows and pursuing Hawks and other large birds, sometimes with an appearance of great animosity, and often wheeling about them as if in play. I have watched it associating with birds so different in walk and flight that it apparently cost it much trouble to keep their company. It has, when flying, a very pretty appearance, even if it is not what Dr. Burmeister calls it, 'the prettiest bird in this country.' But naturalists, like kings, have their favourites, and this species is evidently his. It is rapid and easy in all its motions and exceedingly active; it takes to flight very frequently, and occasionally alights for a moment on a thistle-top, but never on reeds and shrubs, the favourite resting-place of the white *Tænioptera*.

"It is remarkable that its note, which always sounds as if pro-

ceeding from a great distance, however near, is only heard early on still damp mornings.

"As I have little leisure at present, I will defer speaking of the white *Tæniopteræ* till my next letter.

"Very truly yours,
"W. H. HUDSON."

Prof. Owen read a paper on *Dinornis*, containing notices of some of the internal organs of certain species of this genus, together with a description of the brain and of some nerves and muscles of the head of *Apteryx australis*.

This paper, which forms the 16th part of Prof. Owen's series of Memoirs on the extinct birds of the genus *Dinornis* and their allies, will be published in the Society's 'Transactions.'

Mr. R. B. Sharpe exhibited, on behalf of Lord Lilford, F.Z.S., a specimen of the rare *Podoces panderi* of Fischer. This bird had been first described by Fischer de Waldheim, and was one of the chief zoological results of the journey from Orenburg to Bokhara, details of which were given by Eversmann (Reise von Orenburg nach Buchara) in 1823, and afterwards by Meyendorff (Voyage d'Orenbourg à Boukhara) in 1826. In these works the only specimen procured by the travellers on this expedition was stated to have been obtained in the desert of Kisilkoom.

Mr. Sharpe stated his belief that the bird, on further examination, would prove to be a Desert Starling, allied probably to the genus *Pastor*, or, perhaps more strictly, to the South-African genus *Dilophus*, but it appeared to exhibit characters also pointing towards the genus *Certhilauda*.

The following papers were read :—

1. Notes on the Anatomy of the Prongbuck, *Antilocapra americana*. By JAMES MURIE, M.D., F.L.S., F.G.S., &c., Prosector to the Society.

1. PRELIMINARY NOTE.

It might with some justice be affirmed that, among others, two features specially characterize the present epoch of zoological science.

1. One is an unceasing search for the so-called aberrant, intermediate or passage forms, either between genera, families, or orders, nay even between the supposed firmly established classes* of animals.

* Proc. Roy. Instit. of Gt. Brit. 7th Feb. 1868, "On the Animals which are most nearly intermediate between Birds and Reptiles," by Prof. Huxley—a lecture as remarkable for its scope of generalization as for its terseness of language. Since this note was written other papers tending in the same direction, published by that naturalist, as well as the celebrated American, Prof. Cope, have come under my notice. *Vide* Proc. Acad. Nat. Sci. Philadelphia, Nov. and Dec. 1867; the Proc. Boston Nat. Hist. Soc. June 1869; and, lastly, Quart. Journ. Geol. Soc. Lond. Nov. 10, 1869.

2. The other feature is the constant endeavour to rearrange and place in natural systematic position ill assorted groups.

The recent writings of Darwin and his opponents, doubtless, have stirred up the desire of investigating those seeming barriers of demarcation between forms; while the onward accumulation of material and facts necessitates constant change and intercalation among groups but impartially known.

A very good instance in point is the animal upon the anatomy of which the following notes have been made.

The Cabrit or Pronghorn Antelope of naturalists has passed under several generic names, the most critical account of which is to be found in Dr. Richardson's 'Fauna Boreali-Americana,' p. 261. As my colleague Mr. Bartlett, however, has remarked, "None*, however, appear to have hesitated to place it among the hollow-horned Ruminants," until he himself offered evidence to prove "that the Prongbuck is not a true bovine animal." His reasons for adducing cervine, indeed multiple affinities to the Prongbuck instead of those previously accorded it, are based on the annual deciduous nature of its horns, and the total absence of false hoofs and glands—the former phenomenon having been first lucidly described and published by him in our 'Proceedings' for 1866.

Dr. Gray† has called attention to a statement of Dr. Marsh's‡ as early as 1841, respecting this annual shedding of the horns; and it seems also that Dr. Canfield § informed Dr. Spencer Baird (of the Smithsonian Institution) in 1858 of the phenomenon. The hints given by these observers‖, however, were fruitless and not generally credited by naturalists until Mr. Bartlett led the way to the importance of the facts.

Pondering over the apparent isolation of the characters of the animal in question, Dr. Sclater¶ suggested ranking it as a separate family of the order Ruminantia, under the title of *Antilocapridæ*, equivalent to the *Camelopardalidæ*. About the same time Dr. Gray** made a somewhat similar proposition, and demonstrated with some care his ideas of the difference in nature of the horn of the so-called *Antilocapridæ*, *Giraffidæ*, and *Cervidæ*.

Under these circumstances the anatomical structure possesses some interest—and the more so as, excepting a very imperfect description of the skull by Dr. Richardson††, and short cranial charac-

* Blainville and Rafinesque excepted, who place it under *Cervus*—the former, Nouv. Bull. Soc. Phil. 1816, p. 80.

† Ann. & Mag. Nat. Hist. 1866, vol. xviii. p. 324.

‡ In a letter to Dr. Pickering, see U. S. Exploring Expedition, *Ungulata*, p. 63.

§ Proc. Zool. Soc. 1866, p. 105.

‖ As also Weinland (Zool. Garten, 1863, p. 255) and Martin ("Die Hornbildung bei der Mazama Antelope," *ibid.* 1864, p. 254). The former considers the cast horns as abnormal; the latter that the new horn-tip grows downwards. Dr. Günther has drawn my attention to these observations, otherwise unintentionally overlooked by me (*vide* his Record, 1865, p. 45).

¶ Brit. Assoc. Rep. 1866, and abstract Ann. and Mag. Nat. Hist. 1866, p. 401.

** Ann. & Mag. Nat. Hist. 1866, p. 326.

†† *Op. cit.* p. 265.

ters by Turner*, nothing heretofore has been published regarding its osteology and viscera.

With these preliminary remarks I proceed to sum up the general conclusions arrived at by me, leaving the technical description of structures for after consideration. This method of arrangement, though contrary to the general custom, I have deemed preferable in the present instance.

2. Deductions.

The examination of the internal anatomy and osteology of the Prongbuck, although not revealing any passingly strange difference of structural organization from other Ruminantia, yet affords additional evidence to that already known of its exterior—namely, that it does not comport with all those characters considered specially to belong to the family of Antelopes.

The distinctive attribute of Deer undoubtedly is the deciduous nature of their horns; but in the hornless females this diagnostic is oftentimes absent, so that other parts of the organization must be brought to bear in forming a judgment of the creature's relations.

The male and female Prongbuck both possess horns; and, as Bartlett and Canfield have proved, they are annually deciduous. Does this not collate it to the Deer according to the ordinary acceptation, and segregate it from the Antelopes, or, more widely speaking, from the Bovidæ, Ruminants with persistent horns?

Were the systematic place and family relationship of the Prongbuck alone to be decided by the single feature of its horns being shed and renewed periodically, that it is a Deer would be unquestionable.

Considered in a broader phase, by reference to the totality of its structures, the question, Is it a Deer? can best be answered by the verdict, Not proven.

If neither a strict bovine nor cervine form, it is needless to search for nearer affinities; for no other group singly possesses conformation nigher than the said families.

The numerous modifications linking or interblending *Antilocapra* between the hollow- and solid-horned Ruminants, including the Giraffe, certainly stamp it with singularity. Few of the existing mammalian fauna more beautifully show and exemplify by a combination of characters how insensibly gradated are the groups which zoologists so strenuously separate, divide, and subdivide, as if a trifling cordon imposed a sufficient barrier of distinction on what doubtless is a natural series.

My estimable friend Mr. Bartlett judiciously recognized in the Prongbuck affiliation towards the Deer tribe in gait and exterior generally, besides noting that the coat equally pertained to that group as well as to sheep. The soundness of his judgment I have tested in the minute structure of the hair. Weighed in this scale, the balance preponderates in favour of the genus *Ovis*.

In the disposition and possession or in the want of certain cutaneous gland-patches in the Prongbuck, a side light is shed on the

* P. Z. S. 1850, p. 174, *Dicranocerus*.

animal's physiological relations or affinities, which, if not weighty, at all events have their value.

There being neither a suborbital gland (crumen), osseous fossa for the same, nor inguinal sacs and pores, points consequentially to forms exhibiting a kindred build. The total deprivation of the former shows but a remote alliance to the cervine structural peculiarities—though it does not necessarily constitute it an Antelope; for a large section of the Antelopes possess a crumen. But a minor series, chiefly of the Goat-like forms, have it not; and to this group, then, the Prongbuck would be linked—a union which is strengthened by the fact that such Antelopes as are distinguished by the absence of inguinal sacs and pores come under the same group.

Among Ruminants the Chamois is noted as having a glandular sac which opens behind the ear, though some authors indicate *Procapra* as having a postcorneal sinus. In the possession of a subauricular skin-gland *Antilocapra* announces organic relation. Moreover the rank hircine odour from the above, as well as the circumstance of a glandular tail-patch, decidedly point to *Capra*.

In brief, were the place of the Prongbuck to be assigned by the number, situation, and secretion of its skin-glands alone, I should without hesitation rank it among or close to the Goats.

Casting a glance among the viscera and other internal soft structures of *Antilocapra*, the subjoined points demand attention. There being a gall-bladder severs it from the Cervidæ and allies it with the Bovidæ. The stomach having four fully developed cavities, there being no water-chambers in the rumen, and no ileo-cæcal gland exclude it severally from the Tragulidæ, Camelidæ, and Giraffidæ.

The tongue might either belong to a Goat, an Antelope, or a Stag, though probably more like that of the two former than the latter. In the non-development of Cowper's glands, in the manner of the termination of the vasa deferentia, and in the bluntish form of the glans penis, the generative organs denote consanguinity with the Deer, where such structural conditions preponderate in the group. The construction of the larynx has a sort of medium tendency of divergence, the general type being cervine, though the short upper cornua would rather signify kindred with the Chamois and some Antelopes. As to the liver, its having a gall-bladder takes the Prongbuck away from the Cervi, which have no such reservoir.

Regarding dental characters, I can see no obvious distinction between the teeth-pattern of the Cabrit and the family Antilopidæ.

The appendicular skeletal segments show long limbs of a strong but manifestly fine and delicate construction, such alone as belong to the light fleeting Antelope tribe; for in all Deer, Goats, and Sheep of similar size, relatively much stouter leg-bones pervade.

In groups of the Ruminants there is considerable variation in the sternum, according as its component pieces are broad or narrow and the præsternum compressed or flat. As a rule the elementary parts are broader in Deer than in Antelopes; and in this moderate breadth to length the Prongbuck follows the latter. It also agrees with them in the form of its pelvis.

As a whole, it may be said that in its skeleton minus the skull it differs little if at all from most Antilopidæ, and in less or greater degrees is unconformable to the other horned and hornless Ruminantia.

When the cranium is studied and made a subject of analysis as to its taxonomic relations, oddly enough it perplexes, by the conformation of its structure and bearings to different Ruminant groups. The horn-cores in composition and place are those of the tribe Bovidæ—not situated, however, as in the Oxen, the majority of Antelopes, the Sheep, and the true Goats, but after the fashion of the small section of the so-called Caprine Antelopes—that is, erect and supraorbital; but they differ from those of the latter group and closely simulate true Goat's horn-cores in their breadth and compression.

We detect antilopine or caprine formation in the non-depression of the lachrymal bone, in the jutting-out of the orbits, in the contour of the horizontal palatal plate, in the convexity of the glenoid surface, in the rather rudimentary development of the postarticular ridge, and, lastly, in the ensheathment of the styloid process.

To match these, diagnostic points as conspicuously cervine (and partially true bovine) obtain. There are the general flattening of the upper surface of the skull, the bifurcate, pointed, and widely posterior nasals, the great size of the supraorbital fissure, the forking of the subanterior portion of the maxilla, the large supraorbital foramen, the nearly vertical and relatively flat supraoccipital, the differently set and ridged condyle, the broad triangular flattish and small tuberculate basioccipital, and, finally, the moderate-sized triangular auditory bulla.

There is yet to be added to the specialities of this anomalous Ruminant the Giraffe characters of (1) no false hoofs (met with, however, in *Calotragus campestris*), and (2) Deer-pronged and periodically shed horns.

Now, from a review of the foregoing anatomy and externals of the Prongbuck, if I were asked by a single term to denote what the animal is, I should be obliged to Germanize the English phraseology and name it a Giraffe-hoofed, Sheep-haired, Deer-headed, Goat-glanded Antelope — an expression however rugged, yet explicit enough to baffle those who are sceptical of gradational forms.

This much for the first premise from which I started, and which bears out significantly in living forms those tentative remarks concerning the interblending of ruminant types which the excellent M. Albert Gaudry utters in his general considerations of the "Animaux Fossiles de l'Attique" (Paris, 1862, p. 356).

In regard to the second premise, its place—judging from the totality of structure (excluding the brain, not examined), it appears to me that the proposal to rank the Cabrit as a family *per se* (*Antilocapridæ*) merits attention. Notwithstanding what has been said of transitional forms, the present career of biological inquiry has not yet arrived at the stage when limited divisions can be dispensed with, although lines of demarcation are broken apace. Provisionally, therefore, and for aught I can say to the contrary, the single genus and species *Antilocapra americana* may preside as the type of a

family. Still I am far from the opinion that it will long remain in solitary grandeur; for I am convinced that its more aberrant features are but bridges, the further connecting end of which temporarily appears hazy to us from our present circumscribed point of view.

I append such characters (see also Gray and Turner) of the limited group in question as at present appear to me reliable from the known data. I coincide with Messrs. Sclater and Gray as to the family value of the periodically deciduous horns, but do not agree with the former authority (A. N. H. p. 403) in recognizing absence of false hoofs as peculiar to the Giraffe and Prongbuck. Dr. Gray explicitly states of the Steinbok, "False hoofs none" (Cat. Mam. Brit. Mus. "Furcipeda," 1852, p. 71); and specimens which I have examined enable me to corroborate this assertion.

Family Antilocapridæ, Sclater.

Horns hollow, forked, and periodically deciduous.

Dentition.—I. $\frac{0-0}{3-3}$. C. $\frac{0-0}{1-1}$. P. M. $\frac{3-3}{3-3}$ (or $\frac{4-4}{4-4}$?). M. $\frac{3-3}{3-3}$= 32 (or 36?).

Genus Antilocapra, Gray.

Horns in ♂ and ♀, supraorbital; core osseous and cancellated; sheath semicorneous, with agglutinated hairs. False hoofs none.

Cutaneous glands caprine; crumen absent. Nose ovine, hairy. Skull cervine in form; no suborbital depression; fissure wide, lengthened; supraorbital foramen large; nasals furcate, widest posteriorly; orbit slightly elevated above face; masseteric ridge low; auditory bullæ moderate, compressed, angular; supraoccipital perpendicular and concave; basioccipital tubercles abortive; styloid ensheathed; glenoideum convex. Mandibular angle widely rounded. Appendicular skeleton relatively slender. A gall-bladder. Larynx without internal pouching; and thyroid cartilages not prominent. Cowper's glands absent; prostate bifid. Incisors subequal, sloping; molars without supplemental lobes.

Hab. California.

3. Observations on Exterior Points.

The outward zoological characters of the Prongbuck have been accurately commented on by C. Hamilton Smith*, Richardson†, Gray‡, Audubon and Bachman§, Cassin‖, and others, and good figures of the animal and of the horns given by several of the above writers. The talented pencil of Mr. Wolf has also delineated the Society's specimen while it lived in the Gardens (see P. Z. S. 1867, pl. xvii.). Stuffed skins of the horned male and female and of the

* Trans. Linn. Soc. vol. xiii. p. 13, tab. 2.
† *Loc. cit.* p. 266, pl. 21.
‡ Knowsley Menagerie, 19.
§ Quadrupeds of N. America, vol. ii. p. 493, pl. lxxvii.
‖ U. S. Explor. Exped. vol. viii. p. 667 (1853–56).

young animal are exhibited in the wall-cabinets of the British Museum; so that little remains to be added on my part.

Much stress has been laid by Mr. Ogilby* on the presence or absence of cutaneous glands as indicative of affinities among the hollow-horned Ruminants. I made a careful search, therefore, for these on the dead body of the Prongbuck; and the subjoined is the result:—

1. No crumen or suborbital sinus was discovered, as all previous writers have averred.

2. There is, however, a cutaneous gland which exudes a yellow glutinous secretion, situated an inch and a half below the ear. Dr. Richardson evidently alludes to this when he says, "there is a dark blackish-brown spot at the angle of each jaw, which exhales a strong hircine odour"†.

3. No inguinal sacs exist, thus verifying Ord‡ and Dr. Gray's§ character of the genus.

4. In a footnote to his paper, Mr. Bartlett‖ says, "A gland of considerable size exists in the back of this animal, immediately over the white patch." My examination confirms his observation. Dr. Canfield¶ has even more pointedly referred to this when speaking of the glands as "one over the junction of the sacrum with the spine, 6 or 8 inches anterior to the tail."

5. The last-quoted author, in the living animal, says, furthermore, "the Antelope has a very peculiar odour, strong and (to some persons) offensive. This comes principally from the glands in the white part of the breech. One of these is placed over each prominence of the ischium, below and on each side of the tail;" another, as above referred to, No. 4. This statement was substantiated in the dead body of our animal.

6. On both hind limbs, at the hock, behind the joint, and rather to the outside of the leg, there is another cutaneous secreting-gland.

7. Interdigital sacs exist on all four limbs.

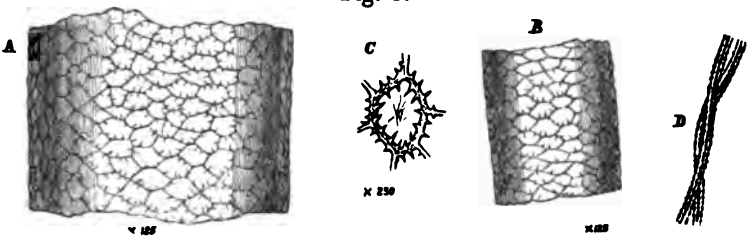
The cutaneous glands of *Antilocapra americana* may be thus expressed:—Present, in pairs, 1 postmandibular or subauricular, 1 ischial, 1 hock, 2 interdigital: total 10 glands. Absent (but occasionally present in other ruminants), suborbital and inguinal.

In a review of the structures of the Saiga I have shown that the hair, among other characters, differentiates it from members of the antilopine group, and, so far as hirsute clothing is concerned, proves it to be a Sheep. When the same test is applied to the Prongbuck, the microscopic texture reveals, of a verity, that its hair also is very unlike that of the Antelopes, say, for instance, Cuvier's Gazelle. In the accompanying woodcut (fig. 1) *A* and *B* delineate the minute textural composition of the hair of *Antilocapra americana* from two regions of the back. Though differing in absolute magnitude, that from the head being the smaller, they yet agree in the delicate nature of the cortical substance and large-sized hexagonal

* Brit. Assoc. Rep. 1833, and Trans. Zool. Soc. vol. iii. p. 60.
† *Op. cit.* p. 267.
‡ Jour. de Phys. 1818.
§ Cat. Mam. Brit. Mus.
‖ *Loc. cit.* p. p. 721.
¶ *Loc. cit.* p. 106.

cell-structure of the medulla. The cell-walls are serrate; as is shown; but under a higher power, viz. 250 diameters, the transverse section, exhibited in *C*, brings out still further the markedly denticular character of each medullary cell. The finer hairs to which the term wool is applicable are depicted in *D*.

Fig. 1.



Microscopic hair-structure of the Prongbuck.

A. Portion from the crupper, seen lengthwise. *B*. A portion, from the occiput. *C*. Transverse section, cell of the medulla. *D*. Two fibres of the wool.

The measure of modification contradistinguishing the hair of the antilopine, cervine, ovine, and hircine families is as follows. In Cuvier's Gazelle (*Gazella cuvierii*), which, for our comparison, may be taken as a fair type of what zoologists class as an Antelope, each hair has a proportionally thick cortex, and the medullary tissue is composed of minute, rather irregular-outlined, compressed cells, ranged transversely to the long diameter of the hair.

In the Red Deer (*Cervus elaphus*) an equally good example of the cervine type, I find that, relatively to the calibre of the hair, the cortical envelope is only moderately thick, whilst the cellular medulla, in proportion to that of the Gazelle or Antelopes generally, is considerably increased. The medullary cells also have large, regular-sided, roundish or subhexagonal-contoured walls, not so squeezed together as in *Gazella* and its allies. In the Wapiti and other undoubted Deer an identical pattern prevails, the only obvious change being in the size of the cells, which slightly vary in different species.

In all Sheep, with but slight specific modification, the hair shows a vast augmentation as respects medulla to cortex, the latter being very thin contrasted with the former. The cells of the medulla are much larger than in Deer, and preeminently so compared with those of Antelopes. Selecting the fleece of the Argali (*Ovis ammon*), as affording a fair example of the hair of the Sheep kind (and it is by no means an extreme instance), it demonstrates the said relative increment in the size of the cells and corresponding diminution of the wall cortex. In this ovine species the medullary cells, from a pure hexagonal contour, assume a tendency to an elliptical figure.

In the Goats a form of hair-structure is met with intermediate between that of Antelopes and Deer. Exemplifying the hircine

family by the Markoor (*Capra megaceros*, Hutton), that noble-looking Himalayan Goat, the elementary composition of the hair under the same microscopic power as the preceding may be thus defined. The entire thickness of the hair is less than in the Red Deer and greater than in Cuvier's Gazelle; the cortical substance is relatively about equal in depth to the last and decidedly greater than in the former or in the Wapiti Deer. The medulla bears an increase of ratio with the Gazelle's, but a decrease compared with the other two forms. The cells are much smaller than in the Deer, though larger than in the Antelopes; and, as if manifesting closer affinities to the latter, besides their narrow transversely ovate character, they further simulate that type in their compression in the direction of the long axis of the hair-tube.

Reverting to the hair of the Prongbuck, it thus becomes evident that it is widely dissimilar in its constituent elements to the Antelope and Goat families. In some respects it approaches nearer to the Deer tribe, though still far from akin. The closest alliance, as far as the hair is concerned, is towards Sheep, though it may be noted that in the marked denticulate condition of the medullary cells it is impressed with a character of its own.

The form of the upper lip in the hollow-horned Ruminants Ogilby has assumed to be a guide of considerable importance, inasmuch as from it we can discriminate affinities of resemblance exercising influence, not only on the animal's habits and economy, but vesting the premaxillaries with special characters. The Prongbuck belongs to his section of browsers in having no muffle, and a hairy nose of the ovine or antilopine type, as Gray duly appends to its generic characters.

Concerning the horns, or rather the process whereby they are shed, Mr. Bartlett's and Dr. A. Canfield's observations are most satisfactory, and excellently related. I agree, however, with Drs. Gray and Sclater as to the nearer structural resemblance of the horns to those of the Bovidæ than the Cervidæ, notwithstanding their deciduous nature. Indeed, as Buffon* has asserted of the Ox, and Ogilby† of the Oryx, Singsing, and Leucoryx, these ruminants offer an example of corneous exfoliation. The last-mentioned authority expresses himself as having verified Buffon's observations, which the great French naturalist's contemporaries ridiculed. After comparing the structure of the young and mature bovine's horns, Ogilby says, "As in the case of the second dentition, the permanent organ is developed under, or rather within, the other, and, by its growth, gradually carries it upwards, and supports it like a sheath or scabbard. The young horn, thus severed from the vessels which formerly supplied it with nutriment, dries up, bursts, from the expansion of the permanent horn within it, and exfoliates in large irregular stripes, leaving the latter with the finely polished surface and solid, sharp, attenuated points which distinguish them. As far as my observations enable me to judge, this exfoliation takes place only once during the life of the animal, and that at the period of adolescence, immediately before the appearance of the first annulus."

* Hist. Nat. t. iv. p. 459. † Trans. Zool. Soc. vol. iii. p. 53.

Thus the extraordinary phenomenon of deciduous hollow horns in the Prongbuck receives a rootlet of explanation; and turns out to be a remote degree rather than a perfect anomaly of kind as respects the development and succession of the supposed permanent horns of the Bovidæ.

Curiosity, a trait of character manifested in the Goats above all other Ruminants, is a predominant feature in the Prongbuck. Richardson (*l. c.* p. 265) tells how the Indians dress themselves in a white shirt, flutter a white rag, or lie down and kick up their heels; and by these means the animals most readily approach.

4. Pathological Remarks.

The history of the Society's male Prongbuck has already been published by Mr. Bartlett (*l. c.* p. 719); but I may in this place add a few words respecting the cause of death. For some time previously to the event the hind limbs exhibited failing power, inducing a tottering unsteady gait; and ultimately complete paralysis ensued. During the lengthened illness great wasting of the body took place. The morbid appearances revealed on *sectio cadaveris* were enlargement of and deposition of firm gritty matter within the lymphatic glands; those of the mesentery and at the root of the lungs were as big as damsons. Distributed throughout the pulmonary tissue, similar tubercular concretions existed in considerable numbers. A few hydatid cysts were found in the omentum; and some small nematoid worms had imbedded themselves within the peritoneal abdominal wall. The lungs were slightly congested, but the abdominal organs rather pallid and bloodless. The precise lesion producing the paralysis was not elucidated; for the skeleton intact was desired for the British Museum, where it is now deposited. From an examination of the caudal vertebræ, after maceration, these appear to have been affected by scrofulous changes; and within the pelvis, on the right side, at the junction of the ilium, ischium, and pubes, there is a nodule of spongy exostosis.

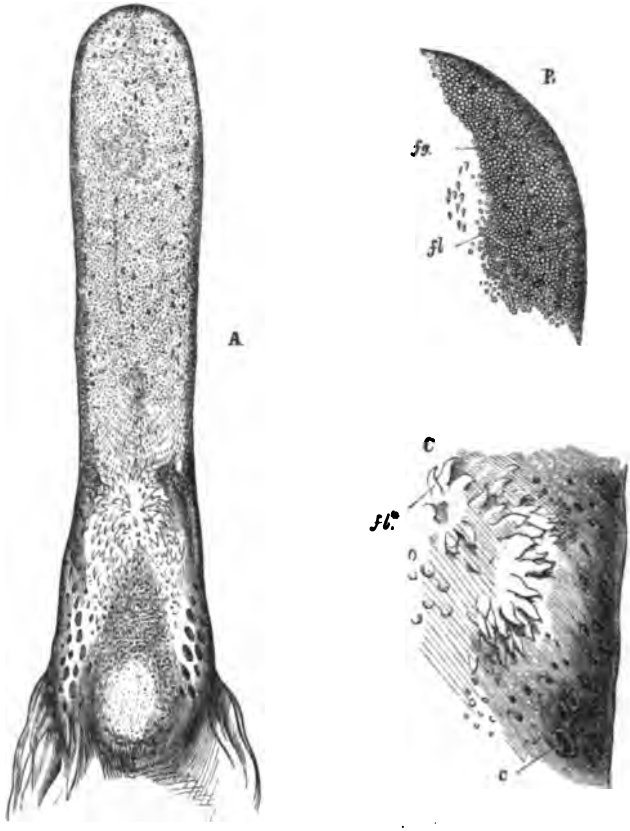
Our damp cold English climate is considered to have a very prejudicial effect upon animals confined in a menagerie. But in the case of the Prongbuck we have the evidence of Dr. Canfield that scrofulous disease followed by inflammation of the joints and lameness, occur frequently among young captured specimens in their native habitat, California. From this I would infer an inherent predisposition, apart from climatic or dietetic influences.

5. Oral and Laryngeal Region.

On viewing the soft palate in position from below, together with the teeth and alveoli of the upper jaw, the whole has a remarkably bottle-shaped outline. Posteriorly the wider palatal surface is smooth, or with only dotted glandular puncta. The narrower anterior half of the palate is traversed by a slightly wavy median groove, the surfaces of the lateral ridges sloping gently towards it. There

are twenty-two of these slightly raised and irregularly curved transverse ridges on either side of the longitudinal median furrow; and each ridge possesses a finely crenate hinder free margin. The most anterior one and the two posterior denticulated ridges are much shorter than the others. On the left side two at least of the ridges merge into each other inwardly.

Fig. 2.



Tongue of the Prongbuck.

A. Dorsal aspect, half natural dimensions. *B* and *C*. Segments of the tip and dorsum near root, magnified to show papillary structures. *fl* and *fl**, filiform, *f g*, fungiform, and *c*, circumvallate papillæ.

A widish oval-shaped anterior palatine canal is situated in the middle of the smooth front part of the palate; and terminally the free border is slightly incised.

The mouth is sparingly lined with flat moderate-sized papillæ as in the Sheep. The faucial membrane is well supplied with mucus-glands. The tonsils, enclosed in a chamber, are each about the size of a pea, and open, as in the Giraffe, by a single wide fossa in the recess on either side behind the faucial pillars, and very slightly in advance of the tip of the epiglottis.

The uvula descends slightly, and is continuous laterally with a raised musculo-membranous ring guarding the pharyngeal opening; so that when the parts are in natural position an approach is discernible to that remarkable sphincter grasping of the cetacean larynx; only, of course, in the Prongbuck the epiglottis and arytenoids are quite diminutive. The pharyngeal constrictors are of moderate thickness, but nevertheless well marked.

Anteriorly the tongue, more Antelope- or Goat- than Deer-like, has a greyish hue—but beneath is of a dull leaden tinge, darker at the sides of the root or where the whitish papillæ are shortest and sparsest. It is spatular in figure, slightly narrowest about the middle, and thins very much at the broadly rounded apex. Length 6½ inches, and from 1¼ to 1½ inch in breadth: the free portion beyond the frænum under ordinary conditions measures 2 inches. Fully more than the anterior half of the dorsum is so crowded with short flattened cuspidate retrocumbent or filiform papillæ (*f*) as to simulate the pile of velvet; these increase in size in the middle line behind and towards the prominent part of the root, where they form a crescent-shaped patch, the horns directed backwards. Posteriorly the papillæ gradate into flattened elevations. The patch above mentioned forms a prominent feature in the tongue of both the Ox and Sheep.

A long strip of separate papillæ circumvallatæ (*c*), some forty or more in number, are found on each lateral aspect of the dorsum, abreast of the papillary patch already spoken of, and behind to the very root. Each is glandular, of a black colour, depressed centrally, and surrounded by a deep fossa. The representatives of fungiform papillæ (*fg*) appear as black dots scattered over the entire dorsum, with the exception of the root. As Prof. Owen* describes in the Giraffe, these obtuse papillæ appear "somewhat sparingly scattered as coarse grains of gunpowder;" only they are necessarily smaller in the Prongbuck.

The larynx does not present any striking external feature such as the great thyroid enlargement of *Antelope gutturosa*† and *Hyomoschus aquaticus*‡, nor internal peculiarity of the subepiglottidean pouching met with in *Gazella dorcas*§ and *Tarandus rangifer*. Indeed, so far as general construction is concerned, it might equally belong to either the Cervidæ or Bovidæ.

The sketch *C*, fig. 3, enables the upper view of the parts to be understood. The epiglottis (*Ep*) is a broad, almost crescent-shaped leaflet, the apex, however, being slightly acuminate. In natural position

* Trans. Zool. Soc. vol. ii. p. 224.
† *Vid.* Pallas, Spic. Zool. tab. iii. fig. 16.
‡ Flower, P. Z. S. 1867, p. 956.
§ Meckel, Anat. Comp. x. p. 604.

it is 0·8 inch broad and about as much in length or fore and aft diameter; glandular impressions stud its surface. There are well-marked fossæ or upper laryngeal pouches (*l. p*) between it and the thyroid alæ. The superior aperture of the larynx (*a p*) is narrow, and 0·8 inch long. Between it and the aforesaid pouches are two broad roughish prominences, together having a V-shaped outline; these elevations are due to the large arytenoids and cartilages of Santorini or Wrisberg? with superimposed fatty tissue and membrane.

As fig. *A* shows, the thyroid cartilage (*T*) is of moderate height (1·3 inch), breadth 1·5 inch, and obtuse in front, the pomum being bulbous but not very prominent. The upper or anterior cornu is remarkably short, barely projecting above the very shallow concave upper border. The posterior border is more deeply scooped out above, but reversely arched below. The inferior cornu is a cartilaginous rod half an inch long. Excepting a narrow deepish notch close to the inferior cornu, the lower border of the thyroid is straight. The front portion of the cartilage is of much firmer consistence than the lateral plates; the latter are flat and without any marked oblique ridge.

The hinder shield of the cricoid (*Cr*) is slightly more than 1·2 inch in vertical, and exactly that in transverse diameter. The surface is broadly convex in the same directions. The upper and lower margins are each widely rounded, the former being mesially concave, but the latter convex, and without any narrowed elongation. The inferior cornu is articulated a line above the lower lateral and wide-sweeping arciform border. The anterior ring completing the cricoid is some 0·3 inch broad throughout, and very moderately bent downwards or towards the trachea. The cricoid is altogether composed of a thicker substance than is the thyroid cartilage; its antero-posterior diameter is 1·7 inch, the front ring projecting as much as (but no more than), the boss of the pomum Adami.

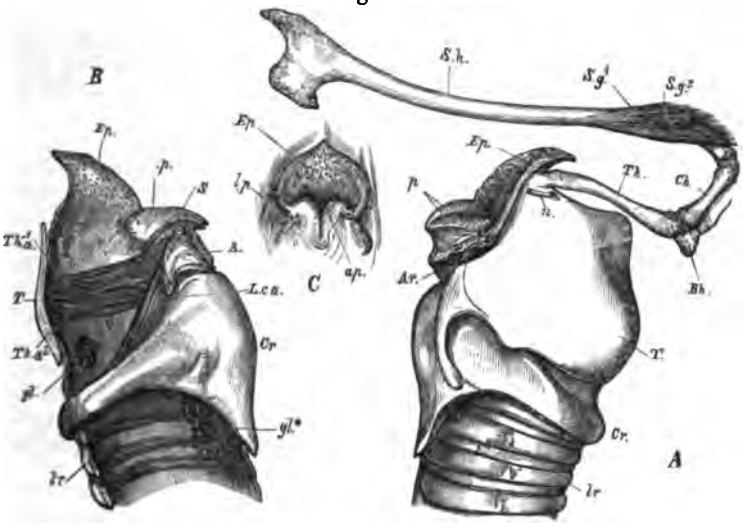
Each arytenoid (fig. 3 B, *A*) is a solid cartilaginous body of a trihedral figure, and 0·7 inch in extreme diameters. Individually the faces and borders are slightly concave. Upon the summit the cartilage of Santorini (*S*), or (Wrisberg?) projects. This is composed of soft yellow elastic ligament, narrow and falciform in figure, and reaches in a tapering manner 0·3 inch behind the arytenoid cartilage. Its thickish part is close upon an inch long.

There is, however, an apparent continuation of the same yellow elastic substance as a thin band, downwards and forwards, from the anterior apex of the arytenoid to the inner thyroid fossa, and constituting the inferior thyro-arytenoid ligament or true vocal cord. These cords approximate in front, but leave behind them a wide wedge-shaped inferior aperture of the larynx or rima glottidis. The superior thyro-arytenoid ligaments, or false vocal cords, are not well pronounced, but still traceable from the fatty tissue above the cornicula laryngis towards the epiglottis.

The membrane between the false and true vocal cords is smoothish and perfectly free from sinuses or ventricles. I observed, though, on the inner mucous surface of the cricoid, and in part on the wall

of the trachea, a few irregular-contoured glandular-like depressions (*gl.*, *gl**); but these I am inclined to consider merely of pathological import.

Fig. 3.



Structure of the larynx of the male Prongbuck.

A. Side view, with attached hyoid bone. *Sh.* Stylo-hyal. *C. h.* Cerato-hyal. *Bh.* Basihyal. *Th.* Thyro-hyal. *S. g*¹. Origin of the stylo-glossus muscle, &c. *S. g*². A second, upper portion, which goes to the root and side of tongue. *Ep.* Epiglottis. *p.* Wrisbergian? projections. *Ar.* Arytenoideus muscle. *T.* Thyroid cartilage. *Cr.* Cricoid cartilage. *tr.* Trachea; and * denotes the lateral ridging of the cartilage rings. *u.* Portions of the superior laryngeal nerve.

B. Section of the larynx—half of the thyroid alæ and tracheal rings being sliced through and partially removed to show the interior structure, vocal muscles, arytenoid and other cartilages. *A.* Arytenoid cartilage. *S.* Cartilage of Santorini; and, above this, *p*, fatty Wrisbergian? projection. *Th. a*¹, Lower, and *Th. a*², Upper thyro-arytenoid muscles. *L. c. a.* Lateral crico-arytenoideus. *gl.*, *gl.** Glandular depressions of pathological origin? The remaining letters apply as in Fig. *A*: a portion of the inferior cornu remains on the cricoid cartilage.

C. Laryngeal aperture, looked at from above and behind. *ap.* Aperture of larynx, with the projections from the Wrisbergian? cartilages. *l. p.* Laryngeal pouch.

There is a double thyro-arytenoid muscle, the lower (*Th. a*¹) being of equivalent volume to the upper (*Th. a*²); and both are strong muscular bands. The superior partly overlaps the inferior portion posteriorly; and together they occupy the outer surface of the arytenoid cartilage, except so much as is taken up by the under-mentioned muscle.

This, the lateral crico-arytenoid muscle (*L. c. a*), has a longish narrow belly, arising partly tendinous from the upper edge of the

side or middle third of the cricoid cartilage, and being inserted into the outer arytenoidal facet.

The fleshy digastric arytenoideus muscle (*Ar*) is of considerable thickness, much expanded at the posterior face of the arytenoid cartilages, and narrow at their middle line of junction.

I may record of the crico-thyroid and the posterior crico-arytenoid muscles that they each are broad, fleshy, of medium thickness, and respectively, along with a well-developed kerato-cricoideus which is present, cover the entire surface of the cricoid cartilage.

Of the extrinsic laryngeal muscles I need say nothing.

The osseous pieces composing the hyoidean arch correspond in number with those of Antelopes; the bones are slender rather than otherwise. Relatively the stylo-hyal (*S. h*) is long, namely, 2·8 inches; its proximal end has a considerable-sized dependent quadrate plate, and a broadish short upward styloid process, lengthened, however, by a tip of cartilage. The epihyals are ossified, and each 0·5 inch long. The cerato-hyals (*C. h*), with a long diameter of 0·7 inch, are slightly curvilinear and intermediate in stoutness between the preceding and the thyro-hyals. The basihyal (*B. h*) is narrow, notable by a prominent tuberous rostrum and partially cartilaginous body. The thyro-hyals are connected to the thyroid alæ by a cartilaginous terminal rod; the length of their ossified part is equal to that of the cerato-hyal.

6. Pulmono-vascular Structures.

The trachea consists of 56 cartilaginous rings counted to the bifurcation, but at the high division of the bronchus 45. In the Sheep there are altogether some 50 in number.

The left lung possesses three lobes, the lowermost, as usual, being the largest. The right lung is divided into five segments, the four upper and smaller ones being long, narrow, and widely separated at their roots. The uppermost one of these receives a separate bronchus at 2½ inches above the ordinary bifurcation.

The heart conforms to the type of ruminants generally. The inferior vena cava enters behind and to the left; the fossa ovalis is closed, and the eustachian valve large. The superior vena cava has a thickish circular muscular layer as it enters the auricle. The auricles are relatively of small size compared with the ventricles. The valves agree with those of the Sheep; but there is a more than ordinary fibrous network crossing between the lower walls of the left ventricle. A firm cartilaginous body (the bone of the heart) 0·3 inch long, lies at the anterior base of the aorta, beneath the tricuspid valves.

The heart has little fat on its surface. It is slightly elongated in form, and fully 4 inches in length from base to apex.

The aorta, after sending off the small cardiac branches, is single for a distance of 1·3 inch, and then bifurcates, the left larger trunk forming the arch and descending aorta. The ductus arteriosus is situated 0·8 inch from the above division. The right trunk, the

arteria innominata, proceeds for about a couple of inches, and then sends off a single branch, which immediately separates into the left brachial and vertebral arteries. Half an inch further on, the innominata splits into three branches, viz. the right brachial, the right vertebral, and the common carotid. The latter is nearly an inch long, and then splits into the right and left carotids and a thyroid branch.

7. Digestive Tract and Glands.

The stomach consists of four compartments, placed in relation to each other in the ordinary ruminant fashion.

The paunch presents considerable proportions when distended, being about a foot in longitudinal and transverse diameter; and its lower end is bifid. The œsophagus, itself narrow and 21 inches long, enters the paunch at its upper and left corner; but it is also partly directed into the left end of the reticulum, as in the Sheep.

The internal thickened folds which partially subdivide the paunch correspond with those of *Ovis*; but the lower one to the right is placed rather more transversely, and does not slant upwards. This gives a greater relative size to the upper compartment of the right half of the rumen in the Prongbuck.

The papillæ lining the mucous coat are of two kinds. One sort, the longest and largest, are found in the hollows and corner pouches; these vary from 0·1 to 0·3 inch long, and are club-shaped, with a roughened warty exterior. The second kind are much smaller, shorter, and closely set, and, together, give a granular appearance to the surface; they occupy chiefly the ridges.

Besides these villi or papillæ, I observed a series of glandular-like bodies scattered widely throughout this first cavity. These were subcircular, cauliflower-like elevations, ranging from 0″·2‴ to 0″·3‴ inch in diameter, and 0·1 to 0·15 inch in height. On section they seemed aggregations of papillæ, but with thickened basal submucous tissue. Although describing these last along with the healthy villous structure, I have reason to believe them a morbid product.

The subglobular reticulum has a less restricted neck than in the Sheep. It is between 6 and 7 inches in its long diameter, and about 4 across. As seen in front, after removal of the stomach from the abdomen, the reticulum partially hides the psalterium; the lower end of the œsophagus and a small portion of the left end of the abomasus also dip behind it. The cells forming the reticulations are rather irregular in size and form, though chiefly hexagonal. They range from 0·2 to 0·3 inch in diameter, and are remarkably shallow. The papillæ are acuminate, the largest being found at the summits of the ridge-like boundaries.

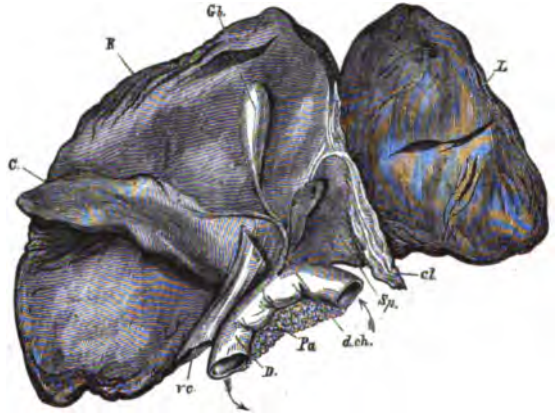
The psalterium is 3 inches long by 1½ inch wide. It has the usual ruminant plications with intervening shorter ones, covered with short, thick-set, mamillary villi.

The fourth cavity, or abomasus, possesses a double curve, and is, as usual, a long cylindrical cavity, narrowing as it approaches the pylorus. The rugæ are fully developed, and longitudinal in direction

as far as the first curve, after which they become chiefly transverse, and are much smaller. The pyloric orifice is circular, less than ⅛ inch in diameter. The fourth stomach is about 15 inches long, and from 1½ to 3½ in diameter.

The total length of the intestinal canal was 68 feet 9½ inches, whereof the small intestines measured 50 feet 5 inches, and the great gut 18 feet 4½ inches. The simple cæcum was 15 inches long, and varied from 1⅛ inch in diameter to 2½ inches near its termination. No ilio-cæcal gland, as obtains in the Giraffe, was noticed in the Prongbuck.

Fig. 4.



Liver, with portion of the duodenum.

R. right, and *L.* left lobe. *C.* Caudal lobe. *Sp.* Lobus spigelius. *Gb.* Gall-bladder. *d.ch.* Ductus communis choledochus. *C.l.* Coronary ligament. *Vc.* Vena cava. *D.* Duodenum. *Pa.* Portion of the pancreas.

The liver (fig. 4) is only of moderate size and thickness, and is somewhat flattened. It is mainly divided by an anterior marginal fissure into a larger right and smaller left lobe; but there is also present a considerably elongated lobus caudatus and a very diminutive lobus spigelius. The entire organ is remarkably free from notches or emarginations.

The right lobe (*R*), fully 8 inches long by 4 broad, contains the gall-bladder (*Gb.*), and to the right of it the caudate lobe. The latter (*C.*) is irregularly tongue-shaped, flat, 4½ inches long by about 1 inch broad, and lies across the right lobe, its tip overhanging the right free margin of the viscus.

The lobus spigelius (*Sp.*) is represented by a very thin and small lappet or lobulus, placed near the transverse fissure, and immediately to the left of the left hepatic duct.

The left lobe (*L*) occupies the remainder of the organ. Its dimensions are 6 inches long by 4 across.

Agreeing with Antelopes, but differing from Deer, there is in the Prongbuck a small pyriform gall-bladder (*Gb*), which lies upon the surface of the right lobe, rather to the left of its middle, but not reaching the upper margin.

The cystic duct, an inch long, joins the right hepatic; and almost immediately after, these turn off at a right angle, the left hepatic duct joining to form the ductus communis choledochus (*d. ch*), which is fully an inch long, and penetrates the duodenum at 5 inches from the pylorus.

The vena cava (*Vc*), of moderate calibre, passes, as usual, along the inferior or attached margin of the liver.

As compared with *Ovis*, the hepatic structures of *Antilocapra* differ in being relatively thinner and smaller, in the greater length of the caudate lobe (which in the Sheep does not overlap the right margin), in the diminished capacity of the gall-bladder, its median position on the right lobe, and its not reaching the free margin.

The Chamois's liver stands a remove further from the Prongbuck. In it the left lobe, and not the right, has the greatest magnitude. The mesial marginal fissure dividing these is wide and deep; the gall-bladder is very capacious, and reaches considerably beyond the outer border, partially within the fissure; the caudate lobe is short and thick.

8. Parts connected with Generation.

The surface of the kidneys are smooth; their figure bean-shaped, but rather roundish than flattened; length fully 2½ inches. The hilus ends in a deep and long sinus, subdividing into fine calyces. The pyramids of Malphigi are rounded, and half a dozen in number; the cortical substance is 0·2 inch thick.

The ureters (*u*, fig. 5) penetrate the under surface of the wall of the urinary bladder at the commencement of the neck and outside the vasa deferens.

On reaching rather beyond the middle of the base of the bladder, the vasa deferentia (*V.d.*) enlarge, approach, and lie alongside each other in the median line, closely invested by a dense areolar sheath. They proceed, adherent, and like a single flattened tube, on the neck of the bladder, towards and between the lobes of the prostate.

The bilobed prostate gland (*Pr.*) lies on the under surface, and at the proximal end of the membranous portion of the urethra. Each flattish, bean-like lobe is half an inch long; and the two, by their position, form a compressed horseshoe figure, fully half an inch wide, embracing the terminal portion of the vasa deferentia.

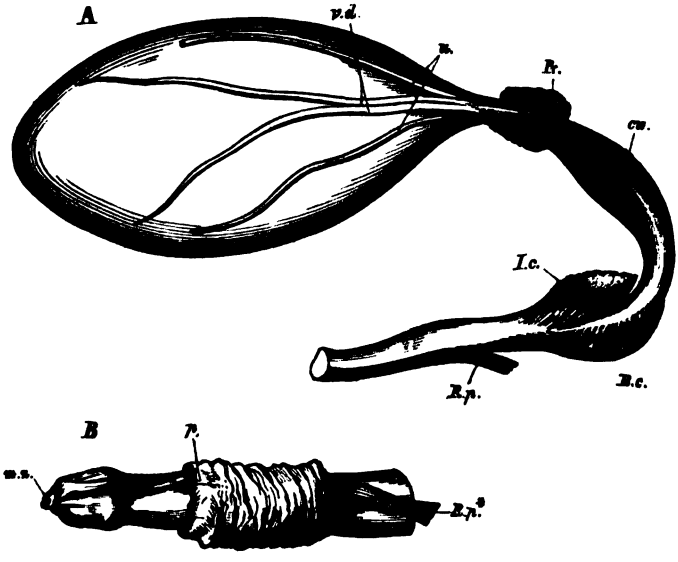
I have preferred to term the bodies above described glandulæ prostaticæ, though perfectly aware they have been regarded, by such a competent authority as Rudolph Leuckart, as vesiculæ seminales in other ruminants. Leuckart's very able article, "Vesicula prostatica," in the 'Cyclopædia of Anatomy and Physiology,' vol. iv., is immediately followed by a clearly reasoned paper by my old friend S. R. Pittard, on the "Vesiculæ seminales;" and I abide by his

remark regarding the organs in question in Ruminantia, when he says:—"It is far from improbable that they are both the one and the other—prostate and vesiculæ at once."

The terminal enlargement of the vasa deferentia in the Prongbuck may correspond to what Leuckart figures as the Weberian organ, or uterus masculinus, in the Deer; and I ought further to observe that I did not detect that differentiation of the said organ from the vasa differentia which obtains in some he-Goats.

The membranous portion of the urethra, $2\frac{1}{2}$ inches long, tapers at either end, but throughout is broadish, flattened, and possesses a deep longitudinal furrow below. The compressor urethræ muscle (*cu*) is of great thickness, and its transverse fibres constitute a continuous arch, tucked into the under groove, from the neck of the bladder to the urethral bulb.

Fig. 5.



Urino-generative organs of male *Antilocapra*.

A. Reduced side-view of urinary bladder and urethral canal. *u*. Ureters, cut short. *V. d*. Vas deferens. *Pr*. Prostate gland. *C. u*. Compressor urethræ; penis cut short, portion of the retractor muscle, *R.p*, being left. *B. c*. Bulbo-cavernosus, and *I. c*. Ischio-cavernosus muscles.

B. Distal end of penis, about natural size. *p*. Preputium. *m. u*. Meatus urinarius. *R. p*.* Insertion of retractor penis.

Cowper's glands appear to be absent; at least I could find no such enlarged prominent bodies as are found in the Chamois, Goat, and some other ruminants. The Prongbuck thus agrees with the Deer, where these glands are wanting. The place of these Cowperian bodies may, however, be supplied by a bilinear, long patch of minute

ducts or crypts, which are found on the floor of the urethral cavity, at its anterior half, in the membranous groove between the inferior portions of the compressor muscle (*cu*). The glandular tubes open by separate puncta within the urethra. Where these terminate at the bulb and narrowing of the urethral passage, there is a semilunar free fold of membrane, forming a short *cul-de-sac* 0·2 inch deep.

The bulbo-cavernosus (*B. c*), the ischio-cavernosus (*I. c*), and the retractores penis muscles (*R. p*, *R. p**) are each fairly developed.

The preputium (*p*) is attached by a frænum 0·9 inch from the tip of the penis. The glans is relatively thick posteriorly, but flattened in front; the tip being of an expanded spatular figure, with the corpus spongiosum and meatus urinarius (*m. u*) barely projecting beyond the terminal border, and not forming a long, free, whip-like process, as in some ruminants.

The testes are small, each being under 1½ inch long.

9. Osteology.

Condition of the Bones.—I have strong reasons for suspecting that the unhealthy condition of the body affected the bones; but if not, these are remarkable for their lightness and porosity throughout the whole skeleton; indeed, as Mr. Gerrard, Sen., remarked, no ruminant skeleton of equal size possesses such delicacy of osseous texture. Comparing the other crania of the Prongbuck in the British Museum with our specimen, they did not feel nearly so light, but nevertheless sufficiently attested such absence of solidity that some might infer it as a quality predominant in the bony frame of this creature.

If one were to speculate upon this fact, it might be given as one reason for the extraordinary fleetness of the creature. Their rapidity of speed is related as something marvellous. Travellers agree that they outstrip a swift horse. Audubon's account* is unique; mentioning the several gaits, he concludes, "While so rapidly do their legs perform their graceful movements in propelling their bodies over the ground, that, like the spokes of a fast-turning wheel, we can hardly see them, but instead observe a gauzy or film-like appearance where they should be visible.

A. *The Cranium.*

(*a*) *Skull as a whole.*—In profile (fig. 6, *B*) the cranium is remarkably elongate antero-posteriorly, and shallow vertically. The summit and base run almost in parallel lines, so as to give great flattening or shallowness from above downwards. This is very unlike most of the living Cervidæ and Bovidæ, where the frontal region is lofty and slopes downwards and forwards often sharply. Some of the Bovines (*Bubalus*, for example) have a tendency to upper levelling of the skull; and among Antelopes such genera as *Oreas* and *Alcelaphus* exhibit lowness in the cranial vault; but in all of these the resemblance is

* *Op. cit.* p. 198.

chiefly due to the depressed rearward angle at which the horns come off. Some fossil forms, however, more markedly agree with the Prongbuck in the above respect, the *Antilope palæindica* of Falconer to wit.

The Deer, as a group, may be said to have a depressed skull; in such forms as the Reindeer and the Elk it is very obvious.

The seeming affinity of the Prongbuck to the Giraffe, in their both being deprived of false hoofs, is dispelled, so far as contour of skull is concerned (the former being deficient in the median frontal protuberance so peculiar to the latter), as well as limitation of great frontal sinuses and breadth of cheek to naso-premaxillary region. Apart from these structural considerations, however, there are other cranial characters equally significant, which demonstrate that the family type of their skulls is not so entirely removed from each other as a hasty inspection is apt to infer.

In *Antilocapra*, as in *Oreas* and some other Strepsiceres, the parieto-occipital is short compared with the very lengthened maxillo-premaxillary region. The orbit, subcircular, of fair size, if not large, has its optic axis directed outwards, and but very slightly upwards and forwards. The horn-cores, which stand erect, as in the Chamois, present, in this aspect, a broad dagger-shaped outline, and are implanted directly above the orbit, from its middle to beyond the rear. If the skull in this view be divided into five equivalent perpendicular segments, the occipito-temporal area would occupy one, the orbito-jugal region another, and the anterior three would consist of the lachrymal and naso-maxillary bones.

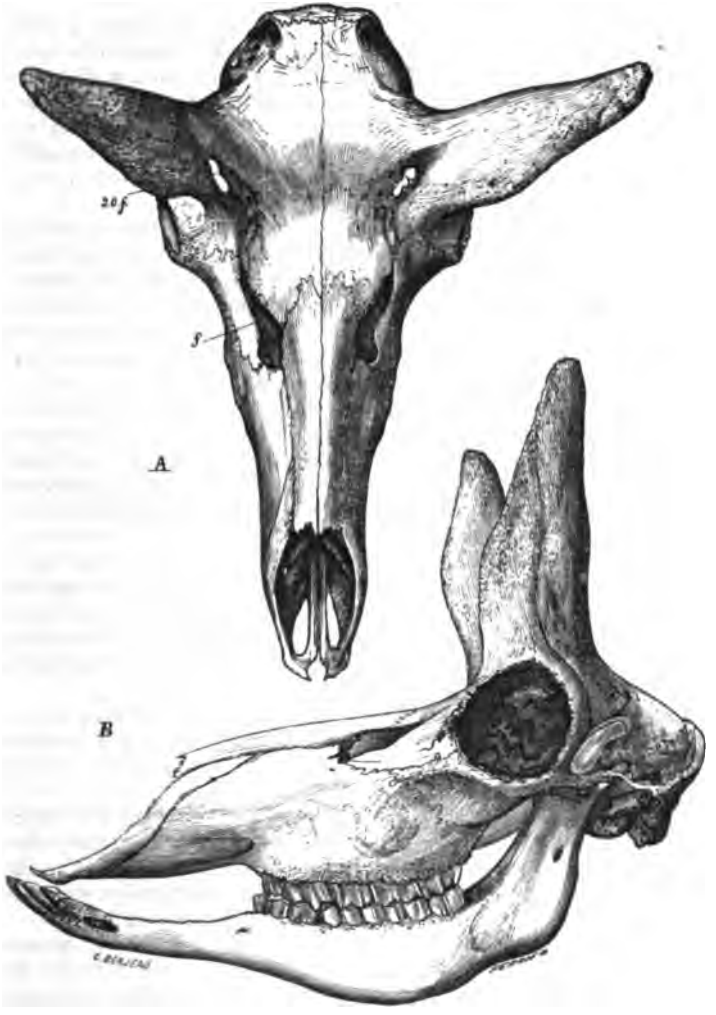
In the erect-horned *Rupicapra*, where the occiput is short, the front of the orbit comes to about the middle of the skull. In many small Antelopes it reaches little short of this; but in the Strepsicerine group the face is proportionally elongated, as in *Antilocapra*. In Deer, as a rule, the facial lengthening is considerable, as in the Prongbuck; but there is this difference, that the postcranial segment is far greater than in the latter.

From the top (fig. 6, *A*), excepting in the very different disposition of the horn-cores, the outline of the skull approaches less to the Giraffe than to most Cervidæ, whilst it does not partake entirely of the Antelope features—even to the Strepsicerine group, which otherwise, in side view, have some points in common. A close resemblance can be traced, however, in the Sassaby (*Damalis lunatus*, H. Smith), though this Bovine Antelope markedly disagrees in possessing an elevated and not flattened intercorneal ridge.

The individuality of upper contour in the Prongbuck's skull is in some measure owing to the abbreviation of the parietal segment, moderate breadth of the frontals, increased, however, by the outstanding orbits, and by the long steadily continued naso-maxillary rostrum, which in most Antelopes and Deer has a decided wedge shape. The horn-cores, as seen looking down upon them, are broad and pass out far beyond the orbital periphery. The nutritious foramina at their base (*s o f*) are large and allow the light to descend quite through the orbit. The so-called supra- or anteorbital fissures

(*f*), as in the Cervidæ and the Giraffe, are of great magnitude, and in the Prongbuck might not inaptly be compared in shape and relative position to the vacuities in the sounding-board of a violin. The anterior nasal opening is as capacious as in the Deer generally, but deviates a little in figure, as it is lower and obviously extends further back.

Fig. 6.



Vertex and profile views, minus the horns, of the skull of the male *Antilocapra* which lived in the Gardens.

so f. Supraorbital foramen. *f.* Fissure.

A posterior view of the cranium minus the mandible (as fig. 7, *B*, illustrates) brings out very well the odd implantation of the horns, basal width apart, and prominent postfrontal flattening. The orbits outlie squarely; and both the horns and horn-cores (*c*) uprise boldly.

(*b*) *Component parts of the skull.*—The long nasals abut against each other with a considerable convexity, toned down, however, by a flattening longitudinally of the summit of the arch. They are inserted into the frontals by a semilunar naso-frontal suture; and their outer margins from behind forwards are bounded respectively by the large suborbital fissures, maxillaries, and a small portion of the premaxillaries. As Turner notes, they are widest posteriorly; towards their middle there is some lateral constriction, and forwards near their tips they gently broaden. The extremity of each is incised by a semilune, so that together, quite in front, they present a broad biconcave edge.

In the top flattening of the nasals, their posterior width, and bifurcate tips the Prongbuck follows the Deer and not the Antelopes. From the absence of a suborbital fossa, unusual extension forwards of the superior maxillary (*Mx*) and more than ordinary dilatation of its ascending or nasal process, the bone presents a remarkably prominent but throughout level cheek-surface; and this gives rather a cylindrical contour to the rostral portion of the face.

Whilst there is well-marked masseteric roughness, there is no ridge rising before the orbit, or only a very indistinct indication of such. The crescentic infraorbital foramen is large but low, and opens a little above in front of the first premolar. The anterior palatal portions of the maxillæ are characterized by the very elevated sharp ridge running from the alveolus forwards.

A feature more akin to Deer than to Antelopes is the way in which the anterior palatal portion of the maxillary forks and embraces the outer limb of the præmaxilla (*Pmx*). This is more marked in some Prongbuck skulls than in others; but in all the coadaptation of the bones, or the sutural line, manifests cervine instead of bovine construction.

In Deer the upper canine tooth is implanted in the said fork or angle; and though, in the adult Cabrit, there is no such tooth extant, yet the bifurcation of the bone may be interpreted as a foreshadowing of the Stag's dental development.

Each præmaxilla is of a fair size; and its ascending limb articulates with and between the nasal and maxillary, in a narrow wedge-form an inch or so in length. The ascending or outer limb is narrowish throughout, the horizontal or inner one slender, and their flattish anterior angle of junction moderately expanded.

The jugal or malar bone (*Ju*), 3 inches long and 1¼ in greatest depth, offers an elliptical outline, a large portion of which constitutes a cheek-buttress. The zygomatic splint posterior to the orbit agrees with that of the Chamois in its uncommon shortness. The segment of the lachrymal contributing to the orbital ring forms no more than an eighth of the circuit; here the lachrymal is broadest, ta-

pering forwards almost to a point, which reaches the hinder border of the ascending or nasal portion of the maxilla. The surface of the bone is smooth and not impressed for the reception of a crumen; and its superior border is excluded from touching the nasal by the intervention of a large open space or fissure (*f*).

The lachrymal of the alpine Gems answers to the above, but the fissure is reduced to a minimum. Most Deer have the bone broadly triangular and deeply sunk for the reception of the suborbital gland. The facial plate of the os unguis in the Camelopard is relatively small. In the Antelopes the lachrymal varies according to the presence or absence of infraorbital fossa and fissure; but in most instances its breadth anteriorly is relatively greater than in the Prongbuck.

The interspace between the frontal, nasal, lachrymal, and maxillary bones, denominated the suborbital fissure (*f*, fig. 6, *A*), is in the Prongbuck, as in most Deer and in the Giraffe, a proportionally extensive area—differing thus from the Bovidæ, where it is notable rather by its diminutive size or absence than conspicuous by its dimensions. The space in question is a shallow depression floored by a thin, smooth, delicate osseous plate, which overlies the post-turbinal bone, and partly of the frontal sinuses. It has an elongate sinuous or *f*-shape, 1·8 inch in antero-posterior diameter, and 0·4 inch in breadth at the widest point. Its anterior horn terminates obtusely or in a rounded manner; the posterior one narrows more, and diverges considerably from its fellow of the opposite side. The fronto-lachrymal suture passes outwards half an inch behind the posterior angle of the fissure.

Those Antelopes with a suborbital fissure have it elliptical and very diminished as regards length and breadth from the foregoing; a few examples (*Damalis pygarga*, Gray, for one) have it placed far forwards. It is large in all Deer, and broadly triangular; but exceptionally it is found partially lyriform, as obtains in the Chinese long-tailed species, *Elaphurus davidianus*, Alph. Milne-Edwards. In the Giraffe it is a large crenated-edged oval.

The frontal, or fore part of the vault of the skull, is broad and remarkably flat, rising, however, a very little towards the coronal suture. The width between the horn-cores is from $2\frac{3}{4}$ to 3 inches. At their inner base, well forwards, is a very large elliptical supra-orbital foramen (*s o f*, fig. 6, *A*), which enters quite through the roof of the orbit; a superficial shallow groove for a venous sinus passes betwixt the foramen and the lyrate supraorbital fissure.

The compressed dagger-shaped horn-cores (*c*, fig. 7, *B*), flattened from without inwards, thickest behind, and narrow-edged in front, spring well nigh directly over the orbit, and with divergently inclined postures, overtop the eye, the tips being 9 inches apart. They are each 5 inches long, and at their broadest part, or where the prong is given off, measure, in different crania, from 1·5 to 2 inches in diameter. From the lateral position whence the osseous horn-supports start, the orbito-frontal rings are partly deprived of that salient configuration which essentially belongs to them.

Each parietal (*Pa*, fig. 7, *B*) constitutes a broad but low arch; the narrow anterior crescentic angle, as in other ruminants, goes down between the squamous postfrontal and orbito-sphenoid elements to meet the alisphenoid.

The squamous element of the temporal bone, agreeably to the low form of the brain-case, is not deep. The convexity of the bone is moderate, and the upper sutural arch long and a little raised. The foramen, situated at the root, and upper surface of the zygoma, common to the Ruminants, in the Prongbuck, as in the Antilopidæ and Ovidæ, is wide to excess; and the perforation is seen to run superficially or within the diploë of the cranium, and to communicate with the mastoidal cells. The articulating surface or glenoid facet (*gl*), moreover, is more bovine- than cervine-shaped; only that the bounding ridge behind and the tubercle and postglenoidal ridge are not so prominently developed as in the former. The external auditory canal (*Au*) is large, and sticks upwards and backwards prominently.

With the discrimination displayed in all his papers, the late Mr. Turner points out "that in the Moschidæ and Cervidæ the styloid process becomes free almost immediately at the base of the auditory process, while in the Bovidæ or Cavicorn Ruminants it is enclosed more or less completely for some distance in the downward and forward direction." *Antilocapra* claims kindred with the latter family in the disposition of its styloid process, which is short and ensheathed. But, furthermore, the moderately enlarged tympanic (*Ty*) does not agree with that of its supposed ally, the Chamois, where it is remarkably triangular and compressed. Neither does it display a roundish inflated character as does the Antelopes', excepting the caprine group. On the contrary, in spite of the styloid ensheathment, the tympanic element of the Prongbuck, as far as my observations go, is singularly cervine or Goat-like in its development. The paramastoid process (*Pmd*) is short, moderately wide anteroposteriorly, and does not underhang or pass beyond the condyles. It is thick-rooted, or has a considerably high rough mastoidal eminence behind the auditory canal.

I have alluded, in the general views of the skull, to the perpendicular character of the supraoccipital plane, and may further note that it is surmounted by a narrow transverse portion suturally connected with the parietals. The truncation of the supraoccipital (*So*) is not only very apparent, but it absolutely inclines forwards below. The spine and occipital protuberance are each well marked. The former is broad, moderately raised, and the muscular impressions on each side are deep rough concavities. The superior curved line forms a wide, sharp-edged, and regularly formed arch, terminating laterally in the short paramastoids, at the root of which posteriorly a short shallow groove is discernible.

The condyles possess two distinct articular planes, which meet in a mesial raised acute line, whose direction is parallel with the posterior border of the paramastoid. Both facets, as in Deer, are relatively flat, the hinder one nearly vertical, the fore one directed ob-

liquely forwards and outwards, though approaching its fellow of the opposite side.

The hollow between the condyle and paramastoid is wide, but only moderately deep. The condyloid foramen is hidden well forwards.

Fig. 7.



A. Basis cranii, and *B*. view from behind of skull of Society's ♂ Prongbuck.

Mx. Maxilla. *Pmx*. Præmaxilla. *Pl*. Palatine. *Ju*. Jugal. *Bs*. Basisphenoid. *Bo*. Basioccipital. *Eo*. Exoccipital. *Ty*. Tympanic. *Pmd*. Paramastoid. *Au*. Auditory. *gl*. Glenoid articular surface. *So*. Supraoccipital. *Pa*. Parietal. *O*. Orbit. *c*. Horn-core. *p*. Prong of horn on left side; the right horn has been removed.

The basioccipital (*Bo*) is an inch broad behind, continued forwards with a steady reduction of breadth to the junction of the basisphenoid (*Bs*). There is a trace of a middle longitudinal ventral crest with wide muscular concavities on either side of it. The so-called posterior tubercles of the basioccipital are badly represented, though not perfectly obsolete as are the anterior tubercles.

No shadow of doubt crosses my mind as to the pattern of the entire occipital bone, which is modelled precisely as in the Cervidæ. The supraoccipital in the Antelopes is protuberant and convex; the condyles have a more rounded mesial division; either the posterior or anterior tubercles of the basioccipitals are well developed, the latter often very convex and prominent. In *Ovidæ* and *Capridæ* the basioccipital is flat but wide, quadriform, with pronounced fore-and-aft tubercles. The superocciput in Oxen offer some resemblances to the Deer and Prongbuck, but their basiocciput is distinctly different in having well-developed tubercles and a deep groove between them.

There is a moderate narrowing forwards of the basisphenoid (*Bs*) in proportion to the breadth of its occipital end, and the bone agrees with many Deer and some Antelopes in the amount of convexity and lateral guttering.

The pterygoid plates and processes are thin, widely apart, and with obsolete hamular processes. The alisphenoid is narrow fore and aft, and the sphenoidal fissures are of great size. The orbitosphenoid plates are less depressed or scooped out than in most similar-sized Ruminants; and as a consequence the orbit appears less deep than in many forms.

The horizontal plates of the palatines (*Pl*) together form about the hinder fourth area of the entire hard palate. Their sinuous maxillo-palatine suture presents a wide arch, interrupted by wide posterior palatal foramina. Between the last molar, retrocedent antrial process, and the wall of the posterior nares there is an unusually deep notch or interspace.

The vomer is very stout, the inferior turbinate bones uncommonly long and inflated.

Three skulls of *Antilocapra americana* in the British Museum vary so very little as regards dimensions, that I have thought the one obtained from the Gardens might suffice, as undernoted, to indicate general admeasurements.

	inches.
Extreme length	11·3
Extreme breadth, viz. diameter at posterior rim of orbit	5·7
Diameter opposite hinder ends of premaxillaries	2·0
Highest perpendicular without mandible, mid-horns	3·6
Height (or depth), vertical, with penultimate upper molar	3·3
Greatest length of nasals	4·2
Distance from anterior upper premolar to tip of premaxillaries	3·7
Length of row of grinding-teeth	2·9
Distance between occipital foramen and semilunar border of the posterior nares	3·2
Diameters of orbit	1·7

	inches.
Vertical depth of the anterior nares	1·7
Vertical depth of the posterior nares	1·6
Distance between tips of horn-cores	9·0
Length of horn-core	5·0
Its greatest breadth—that is, where prong is given off—in different skulls from 1·5 to	2·0
Distance between roots of horn-cores	2·5

(*c*) *Inferior maxillary bone.*—Dr. Gray's figure of the mandible (Cat. of Mam. B. M. 1852, tab. xv. fig. 1, *Dicranoceros furcifer*), though small, sufficiently indicates the peculiarities of outline distinguishing this bone. As is therein shown (and in the present fig. 6, *B*), the direction in which the ramus rises and recedes from the body is more backwardly oblique than in most Ruminants; and this is rendered the more apparent by the unusual rounding-off of the angle. The coronoid process is long, narrow, and straight, or wanting in that convexity of its upper border met with in most Cervidæ and Bovidæ. The sigmoid notch is both short and shallow, and the rather flat-topped facet of the small condylar head almost deficient in neck, whilst its transverse and antero-posterior diameters are not great. The ramal angle, as mentioned above, is the reverse of prominent, and possesses in some specimens a widish but shallow emargination towards the body end.

The dental portion of the body is only moderately deep behind, and is concave below forwards to the diastema. This is long, laterally compressed, and relatively deep, with a sharp upper border; the terminal incisive expansion is of moderate breadth.

The dimensions of the mandible are:—

	inches.
Extreme length from coronoid process to cutting-edge of incisors	10
Length from the angle to the roots of the incisors	8·5
Distance from the front of symphysis to first premolar	3·4
Row of lower grinding-teeth	3·2
Vertical height, a line being dropped from coronoid process	5·2
Length of coronoid process	1·5
Depth of the bone at the middle of the last molar	1·4
Breadth of the bone at the angle	1·6

(*d*) *The skull of* Rupicapra *contrasted with that of* Antilocapra.—The Prongbuck has been closely associated with the Chamois by most classificators of the Artiodactyla, chiefly because of the upright and supraorbital position of the horns, and recurvation of their tips. Mr. Turner, who, in his 'Generic Subdivision of the Bovidæ,' has dwelt more generally on the characters of the skull, still considers them in some degree allied, and follows Dr. Gray in ranking them and others under the title of caprine Antelopes. The cranium of each, no doubt, has some characters in common; but in many points the differences are as well pronounced.

Among other features, the skull of the Chamois compared with that of the Prongbuck shows the following divergences:—1. The

nasals narrow forwards much more and taper to a point, as in the Goats and Antelopes. 2. The supraorbital fissure is minute. 3. The supraorbital or antecorneal foramen is small. 4. The horns are round, more erect, and prongless. 5. The premaxillary does not articulate with the nasal. 6. The frontal region is much rounder and more highly arched. 7. The masseteric ridge ascends high before the orbit. 8. It wants the anterior palato-maxillary valley so conspicuous in the Prongbuck. 9. The horizontal plate of the palate-bone is relatively shorter. 10. In the Chamois the palatine arch of the posterior nares is narrow and acute, in the Prongbuck widish and rounded. 11. In the first of these the basioccipital and the basisphenoid are much flatter than in the second. 12. The auditory bullæ are very small and compressed, much more Goat-like by many degrees than are those of *Antilocapra*. 13. The paramastoid of the Chamois greatly exceeds that of the last-mentioned genus, and is more pointed. 14. The glenoidal articulation is convex to its outer edge, and the posterior transverse ridge is rudimentary. 15. The occiput is antilopine and not cervine in its character, inasmuch as it is prominently convex. 16. The condyles are rounded or not so sharply mesially ridged into a partially double facet as in the Prongbuck and Deer; and they jut rearwards and not so much downwards as in these. 17. The foramen magnum is decidedly very large.

(*e*) *Dentition.*—As respects the deciduous dentition of the Prongbuck my observation is confined to a skull of an apparently adult animal in the College of Surgeons' Museum. In the said specimen, No. 3713, the three upper and lower deciduous premolars present (corresponding to the second, third, and fourth premolars of other Bovidæ?) are partially uprooted and about to be replaced by their successors. The permanent successors seem nearly equally advanced; the canines less so. Judging of the age of the animal by the character of the horns, I should be inclined to think the change of dentition in the Prongbuck coincidentally approximates to what obtains in the Sheep.

The dental formula and series throughout are facsimiles of what is met with in the majority of Antelopes.

The upper molars have smooth shallow outer concavities and low ridges. The hindermost tooth has a posterior tubercle. There are neither supplementary enamel columns nor lobules in these, nor in the lower molars. The median central crescents are of moderate size and simple.

The premolars of the superior and inferior maxillæ are fair-sized, increasing from the first to the third.

The three mandibular true molar teeth have their longitudinal enamel ridges ill defined; the concave internal depressions are very shallow. The outer lobes of the teeth are more angular than rounded. The crescentic fissures of the grinding-surface are simple.

The incisors are sloping, subequal, and not equal-sized as Turner mentions; for the middle ones are moderately expanded at the tips and slightly larger than those outside.

B. *The Extremities.*

(*a*) *Anterior limb.*—Little deviation in the form of the scapula from that of ordinary ruminants is perceptible; it is of a long isosceles triangular shape, with a flat smooth blade, short neck, and well-developed spine (mesoscapula of Parker) an inch high at the middle. A tuberous but compressed coracoid process barely projects beyond the deeply scooped glenoid cup; but no acromion extension is definable as obtains in Bovidæ. The spine is situated anteriorly to the mesial line, so that the suprascapular is one-third less in width than the infrascapular fossa. The axillary border does not present a gutter and slope into the subscapular facies as is the rule in Artiodactyla, but, instead, forms a flat flange or shelf of bone ½ an inch broad at right angles from it, and whereon the teres major muscle arises. The bone of the scapula is 7½ inches in long diameter, and 4 inches broad at the vertebral border; a semiossified cartilage (Parker's suprascapular segment) extends 1¼ inch beyond.

The humerus is shorter than the scapula by 0·3 inch. It has a moderately stout smoothish shaft, the upper half of which on cross-section would yield an antero-posterior subelliptical circumference, but its lower half a transverse one. A depressed articular semilunar head diverges backwards at almost right angles to the shaft's axis. The large inflated inner tuberosity, like the head, is flattish atop; the bicipital groove is broad, elevated rather than depressed, with a wide excavation to its inner side for the insertion of the subscapularis. The outer tuberosity, ruminant-like, is a massive three-sided eminence raised ½ an inch higher than the capitulum; and it partially overarches the bicipital groove, though not at all so sharply in-turned as in the Mazama (*Aploceros americanus*).

A smooth broadish boss marks the place of insertion for the supraspinatus muscle; and an oblique deltoid ridge is amply represented. A minute nutritious foramen enters on the outside of the shaft at the commencement of its lower third.

Laying the radius of the Prongbuck (which measured 7·8 inches long) side by side with that of a Fallow Deer of equivalent length, I observed the former had a narrower rounder shaft, and this gave to its proximal and distal extremities a more expanded character. The less convex but broader shaft of the Dama implied greater strength throughout.

The shaft of the ulna is adnate to the above, it being a thin delicate bony splint, complete, however, from above downwards, and terminating in a well-developed trihedral styloid process. The olecranon is of good size. The entire ulnar bone measures 9½ inches.

From the limb-bones having been wired together in position before I had access to the skeleton, I was unable to compare the individual carpal and tarsal bones with those of other forms. The number, however, appears to agree with the typical ruminants and not with the aberrant Giraffe and Camel—there being in the carpus a scaphoid, lunare, cuneiform, and pisiform in the proximal row, and a trapezoides and os magnum in the distal one.

The cannon-bone of the pectoral extremity is an elegant subcircular rod, 8·1 inches long, and grooved behind for more than three-quarters of its proximal length.

The six phalanges of the digits present no features worthy of remark, further than that they have sesamoid bones appended posteriorly behind their articulating surfaces. The first phalanx is 1·8 inch, the second 1 inch in length.

(*b*) *Posterior limb.*—The formation of the pelvis is of the same long, narrow, and light build characterizing both Antelopes and Deer. The brim has a blunt oval figure, the conjugate diameters being, however, nearly equal. The elongated neck of the ilium has a blade with moderately broad wings, and everted anterior superior spinous processes (*a. s. sp*); the external muscular impressions on this are divided mesially by an elevated ridge. The acetabulum is wide, shallow, and with deep synovial notch. The symphysial portion of the pubic bones is flattish, wide, and indeed rather broad above; it is 3 inches long, with a roughened symphysis; the subpubic angle is obtuse. There is only a moderate expansion of the usual tripodal-figured ruminant ischium; the tuber ischii (*ti*) is broadly rounded, and not prominent as is the external ischial spine (*e. sp*).

The pelvic measurements are as undernoted:—

	inches.
Extreme length from the anterior superior spinous process to tuberosity of ischium	8·5
Greatest breadth (crests of ilia)	5·5
Distance between external ischial spines	5·2
Brim of pelvis (aut. post. diam.)	3·2
Brim of pelvis (transverse diam.)	2·2
From centre of acetabulum to tip of crest of ilium	4·5
Symphisis pubis	2·8

The head of the femur is subglobular and small. The great trochanter, laterally flattened, rises ½ an inch higher than the head. The trochanteric fossa is, as in other ruminants, wide, but only moderately deep. The stoutish shaft, though less so than in *Dama vulgaris*, has usually a slight forward bend; and the nutrient foramen obliquely penetrates the front of the shaft at its upper fourth. The linea aspera is both broad and well defined. Though the distal extremity of the thigh-bone does not offer such comparative magnitude as in the Giraffe, its condyles nevertheless are large and backwardly extending; the outer is the larger and most tuberose. The groove and pit for the popliteus muscle is not so well marked as in *Dama vulgaris*.

As regards the fibula, in its non-development of shaft, depending spicule representing its upper extremity or head, and inferior kidney-shaped and separate bone homologous with its styloid process the structure resembles that of Sheep.

The tibia has a length of 10·3 inches. The head is large, the anterior tuberosity or cnemial prominence moderate and sharp-edged in front. The groove for the tibialis-anticus tendon is deep and broad. The shaft is stoutish, convex anteriorly, but doubly

grooved and ridged posteriorly for the attachment of the long flexor muscles. The internal malleolus is large, triangular, and flat.

The tarsus consists of os calcis, astragalus, adnate cuneiforms, scaphoids, and a cuboid.

Fig. 8.



The male pelvis: *a. s. sp.* Anterior superior spinous process; *e. sp.* External ischial spine or tuberosity; *t. i.* Tuber ischium.

The conjoined metatarsals of the hind limb or cylindrical cannon-bone, as in the majority of Antelopes and Deer, evinces a greater tendency to duplicity than does its equivalent bone of the pectoral extremity—this by its being grooved throughout in front, but not deeply cleft. There is also longitudinal grooving in its after surface, but only in its lower part, the gutter being shallow. This cannon-bone measures 8·7 inches in long diameter, and shows a very slight lateral flattening of the shaft. There is an entire absence of accessory splints, or rod-spicules, corresponding to extra metatarsals, and the same may be said of the metatarsal segment of the fore limb. The osseous conformation thus tallies with the outer aspect of the legs in deprivation of false hoofs.

The digits and their additional sesamoidea are completely identical with those of the fore foot.

C. *Vertebral Column and Thorax.*

(*a*) *Spine.*—The vertebral elements present in the spinal column

are 35. Several of the last caudal, it may be noted, are wanting, having been injured during the process of maceration; so 37 to 38 may more truly be considered the total number. Of those present, 7 are cervical, 13 dorsal, 6 lumbar, 4 sacral, and 5 caudal.

The cervicals are distinguished by their great size, compared with the other spinal regions. The 5 hinder ones interlock with each other by well-marked opisthocœlian articulations. This is not uncommon in a partial degree among ruminants, but is best observed in the Camelidæ and Giraffidæ.

The atlas is appreciably flattened and broad. Its condylar articular surface is low and without the outer double notch of the Goats and Sheep. The transverse process is a thin wide plate of bone, ending backwardly in a rounded flattish process. The vertebral foramen pierces it vertically, and then horizontally passes through the neural arch. A rudiment of a neural spine exists at the middle of the bone, flanked forwardly by two deepish grooves. The body has a moderate-sized hypapophysial keel.

The axis has a neurapophysis an inch high, which runs the entire length of the vertebra; anteriorly the spine projects as a process forwards, but posteriorly is truncate. A sharp-pointed barb-like anapophysis overlaps the third vertebra. There is a well-marked keel, more fully developed, however, in the third, fourth, and fifth cervicals. The vertebral foramen perforates the neural arch in front.

Neural spines are wanting in the third and fourth vertebræ; but, as in most ruminants, it is developed in the fifth, and lengthened in the sixth and seventh. The laminar arches of the third, fourth, and fifth are marked by a postmedian depression as well as lateral ones. The second, third, and fourth cervicals are the longest. The pleurapophysial element of the transverse process of the sixth cervical is unusually broad.

The dorsal vertebræ, in a bird's-eye view, are seen steadily to decrease from the cervical towards the lumbar region. The centre of movement of the spine hinges on the tenth dorsal vertebra; this is shown by the change of direction forwards in the neurapophysis.

The first dorsal spinous process is of considerable length; and from it to the third they increase in size; between this latter and the sixth they remain nearly uniform in length, and slope sharply backwards.

The next four gradually shorten. The last three dorsal neurapophyses are broader and directed forwards.

A metapophysis in the form of a tubercle is developed on the first dorsal vertebra, enlarges on to the third, then remains small as far as the eleventh. The twelfth and the thirteenth increase in magnitude and approach the prominent plate-like form found in the lumbar region. The dorsal vertebral region measures 13½ inches.

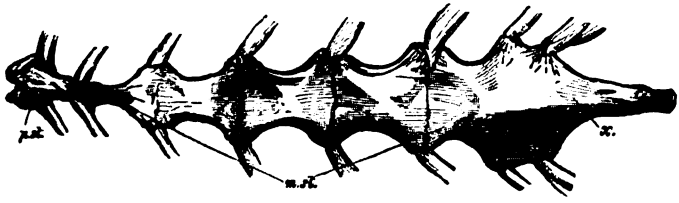
The bodies of the six lumbar vertebræ are subequal in size. Their transverse processes are only of moderate breadth, but very long, and subequal from the second to the sixth. The neurapophyses, on the other hand, are very broad, of nearly uniform height, and curve forwards. The metapophyses are prominent and thick; the inter-

spinal muscular fossæ deep. Between the last lumbar and first sacral vertebral lamina there is a large lozenge-figured interspace.

The funnel-shaped sacrum has a length of 3¼ inches; and its anterior transverse diameter is almost as much. The sacro-iliac synchondrosis is formed by a single articulation of the foremost vertebral element; it possesses but a diminutive neural process. The three hinder vertebræ belonging to the sacrum are partly anchylosed, and possess spines subequal in height; their transverse processes are anchylosed, so as to form a tapering vertical plate of bone parallel with and as high as the neural spines.

The caudal vertebræ, as already mentioned, were imperfect, five alone being present, the small terminal factors having been lost. Those extant, together 4½ inches in length, were remarkably porous, evincing a diseased condition or atrophy of the cancellous tissue. The first or anterior caudal possessed broad transverse processes of bony plates, but gave off no backwardly extending zygapophyses; the remaining vertebral bodies diminished in size, but each had long slender prominent spicula passing distally.

Fig. 9.



Ventral view of the sternum and sternal ribs.
p. st. Præsternum. *m. st.* Mesosternum. *x.* Xiphosternum.

(*b*) *Chest.*—The eight elementary constituent parts of the sternum are partially coalesced, so that it appears to be composed of but five separate pieces. Of these the foremost are narrow, stout, and cylindroid, the middle and hindmost on the contrary wider and thin. The manubrium or præsternum (*p. st*) of Parker* is bifid anteriorly. It is a short stout bone, with an upward projecting boss between the first two ribs. The thick vertically narrow second and the rather wider third elements are ossified together; the fourth and fifth expand in breadth but diminish in thickness. The sixth, seventh, and eighth fœtal segments are firmly united, the seventh or post-mesosternal being the broadest of the whole series.

The xiphosternum or ensiform piece (*x*) is a long, flat, and strong process of bone, narrowing considerably at its distal and finally truncated extremity.

Eight sternal ribs or costal cartilages on each side abut against the lateral margins of the sternum.

The ribs number thirteen pairs, of which eight are true and five false. The first two are nearly straight or with but slight arching.

* 'The Shoulder-girdle and Sternum in the Vertebrata,' Ray Soc. 1868.

The three or four hinder ones are slenderer than the others in advance, which are broad but only moderately strong. It is not until the ninth is reached that the maximum of length is obtained.

The hyoid bones have been described along with the laryngeal apparatus (*anteà*, p. 348).

2. Some Remarks on the Poison-glands of the Genus *Callophis*. By Adolf Bernhard Meyer, M.D.

In a paper published in the 'Monatsberichte der k. preuss. Akad. d. Wiss. Berlin,' March 1869, I gave a description of the large poison-glands of two snakes belonging to the Asiatic Elapidæ, namely, *Callophis intestinalis*, Laur., and *C. bivirgatus* (Boie). These glands are situated in the body-cavity itself, and occupy from one-third to even one-half of the whole length of the snake, and, in consequence thereof, influence the situation of the intestines, pushing them back towards the tail. I did not find these poison-organs in *C. maculiceps*, Gthr., nor in *C. calligaster* (*Hemibungarus*, Pet.). Afterwards J. Reinhardt observed (Vidensk. Medd. fra den Naturhist. Forening i Kbhvn. 1869, n. 6–8) that also *C. gracilis*, Gray, and *C. m'clellandii*, Reinh., do not possess these glands, but only the usual apparatus. When I published my first paper I had had no opportunity of examining these snakes, but I have now taken advantage of the extensive materials in the British Museum and of the kindness of Dr. Günther to extend my researches over all the known species of the genus *Callophis* (except *C. japonicus*, Gthr., of which there is only one, typical specimen).

I can confirm Reinhardt's statement of the absence of the poison-glands in question in *C. gracilis* and *C. m'clellandii*, and have found that all the other species of this genus likewise do *not* possess the glands, viz. *C. trimaculatus*, Daud., *C. annularis*, Gthr., and *C. nigrescens*, Gthr. Likewise *Megærophis flaviceps*, Reinh., a snake which resembles strikingly *C. bivirgatus* (var. *tetratænia*, Bleeker), except in the vertebral scales and the head-shields, does not possess this peculiarity, but only the usual gland.

I found, however, the gland in all the varieties of *C. intestinalis* and *C. bivirgatus*, viz. in var. *malayana* (*Elaps thepassii*, Bl.), as already stated by Reinhardt, in var. *philippina* and var. *melanotænia*, Bl., of *C. intestinalis*, and in var. *tetratænia*, Bl., of *C. bivirgatus*.

We can therefore affirm that only the *Callophides* of the islands in the Malay archipelago, and of the Philippine Islands (which inhabit the Malayan peninsula too, and *C. intestinalis* also Central India), possess this large poison-apparatus, whereas the *Callophides* of Central India and the Malayan peninsula do not possess them. Whether it be allowable to found on this character a generic difference or not, can only be decided after further researches on the skeleton &c. of these snakes, which I am prevented now from undertaking, as I am about to depart for the Malay archipelago.

But it seems probable that other points of structure, not yet known, may correspond with this character, which will enable us to find out the natural affinities of these snakes. In the highest degree remarkable is it at all events that *C. gracilis* does not possess this poison-gland, as it resembles *C. intestinalis* in such a manner that only after exact examination the differences of colour and marking are visible. Can we here have to do with a case of mimicry? as it might be of advantage for *C. gracilis* to mimic *C. intestinalis*, more formidable in consequence of the poison-apparatus. I may remark that *C. intestinalis* has a wide area of distribution, whereas *C. gracilis* has only been found at Pinang and Singapore; and we know, from the researches of Messrs. Bates and Wallace, that all mimicked species are widely spread and plentiful, while the mimicking species are rare and confined to a restricted region. Perhaps, too, the great resemblance between *Megærophis flaviceps* and *Callophis bivirgatus* (var. *tetratænia*) is another example of mimicry, the latter having this formidable poison-apparatus, and *M. flaviceps* not, and the latter being rare, the former very plentiful. But only further observations can determine whether this explanation is a right one or not.

That *C. japonicus*, Gthr., possesses the large poison-gland is not probable, as it approaches in its characters to *Hemibungarus*, which does not possess it.

3. Notes on some Fishes from the Western Coast of India. By Surgeon Francis Day, F.Z.S., F.L.S., Madras Army.

Having received leave last February to proceed from Madras to Europe, I availed myself of the opportunity of crossing that Presidency by rail to Beypore on its western or Malabar coast. Passing on to Calicut, I obtained a few fishes there, when, finding it would be a week before the steamer could arrive, I paid a flying visit to Vithry in the Wynaad range of hills, as there were several questions respecting the fishes of that mountain-range which I was desirous of solving. With respect to some of these I believe I have been successful; a few, however, must still remain for further inquiry and future investigators.

Arriving off Mangalore I received a small but very interesting collection of the fishes of South Canara, from H. E. Thomas, Esq., C.S., the collector of the district, who has paid great attention to the finny inhabitants of his range.

In the following remarks it is not my intention to refer to all the species I obtained, but merely to those apparently new, or respecting which I have a few remarks to record.

Family Percidæ.

Ambassis thomassi, sp. nov.

B. vi. D. $7|\frac{1}{11}$. P. 15. V. 1/5. A. 3/10. C. 15. L. l. 38. L. tr. 6/13.

Length of head $\frac{2}{7}$, of caudal $\frac{1}{4}$, height of body $\frac{1}{3}$ of total length.

Eyes. Diameter not quite $\frac{1}{3}$ of length of head, $\frac{3}{4}$ of a diameter from end of snout, $\frac{1}{2}$ a diameter apart.

The posterior extremity of the maxilla extends to under the centre of the orbit. Vertical and double edge of horizontal limb of præopercle and also margin of interopercle strongly and evenly serrated. Nine strong teeth directed posteriorly, along the lower edge of the præorbital. One spine at the posterior superior margin of the orbit; the lower two-thirds of the orbital edge serrated.

Teeth fine, in jaws, vomer, and palate.

Fins. Second dorsal spine strong, and as long as the head, without the snout. Caudal deeply forked.

Lateral line continuous.

Colours. Greenish, shot with silvery; no lateral silvery band.

Hab. Calicut and Mangalore. I have named the species after Mr. Thomas, who obtained the finest specimen, $3\frac{1}{2}$ inches long.

Family Nandidæ.

Badis dario, Ham. Buch.

B. vi. D. $\frac{14}{8}$. P. 9. V. 1/5. C. 15. L. l. 26.

Lateral line absent in this species, which otherwise closely resembles the *B. buchanani*.

Hab. Wynaad range of hills.

Family Ophiocephalidæ.

Ophiocephalus diplogramme, Day.

B. v. D. 43. P. 15. V. 6. A. 27. C. 15. L. l. 112. L. tr. $\frac{7-8}{13-12}$.

I received a specimen 8 inches long from Mr. Thomas, and was informed the species was not uncommon in Canara.

In the adults the reddish colours fade, but the bands are very distinct.

Family Chromides.

I obtained both the *Etroplus suratensis*, Bl., and the *E. maculatus*, Bl., at Calicut.

Family Siluridæ.

Callichrous bimaculatus, Bl.

Having, through the kindness of Dr. Günther, been enabled to examine the typical specimen of this fish from Dr. Bleeker's collections, no difference is apparent.

Macrones armatus, Day.

? *Bagrus montanus* et *malabaricus*, Jerdon.

Hab. Wynaad and fresh waters of the plains, also Mangalore.

Family Cyprinidæ.

Lepidocephalichthys balgara, H. B.

? *Cobitis carnaticus*, Jerdon.

This fish is very similar to the *L. thermalis*; but in this species the dorsal fin, consisting of 8 rays, is opposite to the ventrals, in the latter it is in advance of them.

Colours. Body dotted with rows of black spots; a black ocellus at the upper margin of the base of the caudal fin; six to eight rows of black spots along the dorsal fin, and about ten more broken-up lines of spots on the caudal, which is cut nearly square.

The suborbital spine becomes minute in this species when adult.

Hab. Wynaad.

NEMACHEILUS SINUATUS, sp. nov.

B. iii. D. $\frac{2}{8-9}$. P. 12. V. 8. A. 2/5. C. 18.

Length of head $\frac{1}{5}$, of caudal $\frac{1}{6}$, height of body $\frac{1}{6}$ of the total length.

Eyes situated in the middle of the length of the head, 2 diameters from end of snout, $1\frac{1}{2}$ diameter apart.

Barbels long and thin.

Scales distinct.

Lateral line ceases opposite the end of the dorsal fin.

Fins. Dorsal arises slightly in advance of the ventrals, and midway between the snout and the base of the caudal, which last is cut square, but some of the outer rays are rather shortened.

Colours. Body olive, with irregular vertical brown bands, having shorter intermediate ones. A black ocellus exists at the base of the upper portion of the caudal fin. Dorsal yellow, with three or four rows of black spots. Caudal orange, with four sinuous black >-shaped bars with an inverted centre.

Hab. Wynaad.

LABEO NIGRESCENS, sp. nov.

B. iii. D. 2/14. P. 15. V. 9. A. 2/5. C. 21. L. l. 36. L. tr. 6/7.

Length of head $\frac{1}{5}$, of caudal $\frac{1}{5}$, height of body $\frac{2}{7}$ of the total length.

Eyes. Diameter $\frac{1}{5}$ of length of head, 2 diameters from the end of snout.

Snout rather swollen, rounded, and somewhat projecting over the lower jaw; a small lateral lobe; glands over the whole of the snout. A very distinct labial fold both above and below, a deep transverse groove across the chin; lower lip deeply fringed. The rostral barbels reach to beneath the anterior margin of the orbit, the maxillary to below its posterior third.

Fins. Upper margin of dorsal fin straight; the pectoral extends to the ventral, which latter fin reaches the anal. Anal rather elongated anteriorly, and if laid backwards it reaches the base of the caudal, which latter fin is deeply forked.

Scales. Four and a half rows between the lateral line and the base of the ventral fin.

Colours. Deep brown, each scale with a black spot at its base. Fins black.

Hab. Mangalore.

The *Crossocheilus reba*, H. B., exists in the Wynaad and South Canara rivers.

BARBUS (BARBODES) JERDONI, sp. nov.

B. iii. D. 3/9. P. 17. V. 9. C. 19. L. l. 28. L. tr. 6/4.

Length of head $\frac{1}{6}$, of caudal $\frac{1}{4}$, height of body $\frac{1}{4}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, 1 diameter from end of snout.

Body compressed, a considerable rise to the base of the dorsal fin.

The maxilla extends to under the anterior margin of the orbit. Four thin barbels, the maxillary pair as long as the orbit, the rostral a little shorter.

Fins. Dorsal arises midway between the snout and the base of the caudal; its third ray is entire, osseous, weak, not enlarged, and as long as the head without the snout. Caudal forked.

Scales. Four rows between the lateral line and the ventral fin.

Colours. Silvery; fins tipped with black.

Hab. Mangalore.

BARBUS (BARBODES) PULCHELLUS, sp. nov.

B. iii. D. 4/9. P. 17. V. 10. A. 3/6. C. 19. L. l. 30. L. tr. 6/5½.

Length of head $\frac{2}{5}$, of caudal $\frac{1}{5}$, height of body $\frac{2}{7}$, of dorsal fin $\frac{3}{5}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, 1¼ diameter from the end of the snout.

There is a very gradual rise from the snout to the base of the dorsal fin.

Interorbital space nearly flat. The anterior two-thirds of the præorbital covered with large mucous pores. Four fine barbels, the maxillary pair being the longest, equalling one-third of the length of the head. Mouth of moderate width.

Teeth pharyngeal, crooked, pointed, 4, 3, 2/2, 3, 4.

Fins. Dorsal arising slightly anterior to the ventral and rather nearer to the snout than the base of the caudal fin; its upper border is concave, it is two-thirds the height of the body, its last undivided ray being weak, smooth, and articulated. Anal of moderate size. Caudal deeply forked.

Scales. Four rows between the lateral line and the base of the ventral fin.

Lateral line nearly straight.

Colours. Deep grey, with darker bases to each scale. A black band runs from the eye to the centre of the base of the caudal fin.

Hab. I received one stuffed specimen, 17½ inches long, from Mr. Thomas, C.S., who found the species frequenting the inland streams.

BARBUS (BARBODES) MOSAL, H. Buch.

Mahseer.

Dr. Günther, in his 'Catalogue of Fishes,' vol. vii. p. 130, places the *B. tor*, H. B., as one of the synonyms of the *B. mosal*, H. B.

The species, if it is distinct, which exists in South Canara, is the *B. mosal*, H. B., whilst I have taken the *B. tor* in the Bowany and also in Orissa. In the Calcutta Museum are two specimens of the latter variety.

The question is, are the *B. mosal* and the *B. tor* the same? and this must be decided by fresh investigations in India. The difference between the two does not depend on age, as I have examined both from 6 to 30 inches in length; neither does it depend on season, which I have not found to exercise any influence: it may be due to sex; but I doubt it.

The number of rays, scales, and the proportions of the two fishes, *posterior to the eye*, appear to be identical; but the great differences are in advance of that organ.

In the *B. tor* the snout is pointed and compressed, the lower jaw being the shortest, the mouth is somewhat deeply cleft, whilst cartilaginous thick lips exist in both jaws, forming a lobe above and below; the summit of the head is mostly flattened.

In the *B. mosal* the snout is rounded and not compressed, the jaws of equal length, the mouth is not deeply cleft, and there are no thickened cartilaginous lips. The summit of the head is convex.

Both *Barbus* (*Barbodes*) *conirostris*, Günther, and *Barbus* (*Barbodes*) *carnaticus*, Jerdon, were found to be common in the Wynaad and rivers around their bases. They were also received from Mangalore. It appears not improbable that *Barbus mysorensis*, Jerdon, is the same as *B. conirostris*, Günther. The species I termed *B. dubius*, I find, has five series of scales between the lateral line and the base of the ventral fin.

BARBUS (CAPOETA) AMPHIBIUS, C. & V.

Systomus carnaticus, Jerdon.

Cuvier and Valenciennes have stated their species has no lateral blotch on the side of the tail, whilst the *B. carnaticus* has one. Having examined several of my fresh specimens, with an old one in the British Museum, in which the lateral blotch appears to have become bleached, no difference is apparent.

BARBUS (CAPOETA) ARULIUS, Jerdon.

I find, on examining a large number of fine specimens of this species, obtained in the Wynaad, that it has a maxillary pair of fine long barbels.

BARILIUS GATENSIS, C. & V.

? *Opsarius malabaricus*, Jerdon.
Barilius rugosus, Day.

Having obtained numerous specimens of this fish from the rivers of the Western Ghauts, whence Cuvier's also were procured, I find it apparently identical with the *B. rugosus* of the Neilgherries. The remark in Cuv. & Val., however, that the *cheek is entirely covered by the suborbital ring*, is erroneous; a portion equal to about one-

fourth of the height of the third suborbital bone is left uncovered. My reason for supposing this fish may be *Opsarius malabaricus*, Jerdon, is that I found it very numerous, as Jerdon remarks, in "the streams that run from the Western Ghauts into North Malabar," and that it was the only species of the genus which I could find there, whilst the difference is that the *O. malabaricus* is said to have fourteen dorsal rays. If they are not the same, Jerdon has entirely overlooked this common species, which I think is very improbable; consequently D. 14 I believe to be a misprint for D. 10.

BARILIUS CANARENSIS.

Opsarius canarensis, Jerdon.

B. iii. D. 2/10. P. 15. V. 9. A. 2/13. C. 21. L. l. 38. L. tr. 9/4.

Length of head $\frac{2}{9}$, of caudal $\frac{2}{9}$, height of body $\frac{1}{4}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, more than one diameter from end of snout.

This species is very similar to the *B. gatensis*, C. & V., differing, however, in a few points: there are a smaller number of rays in the dorsal fin; the inferior lobe of the caudal is the longest; the lower jaw is less broad; and the dorsal commences midway between the snout and the base of the caudal.

Scales. Two and a half rows between the lateral line and the base of the ventral fins.

Colours. Greenish above with purple reflections, golden on the sides and beneath; a double row of large green spots along the sides as far as the base of the anal, when they become single; dorsal, caudal, and anal dark grey, with broad white margins.

Hab. Mangalore.

DANIO MALABARICUS.

Perilampus malabaricus, Jerdon (male).

Perilampus canarensis, Jerdon (female).

Are identical with *Danio micronema*, Bleeker. I obtained numerous specimens in the localities where Dr. Jerdon records having collected his. *Danio alburnus*, Heckel, is probably the same, the barbels having been overlooked.

4. List of Additional Species of Land and Freshwater Shells collected by Mr. E. Bartlett in Eastern Peru, with Descriptions of New Species. By HENRY ADAMS, F.L.S.

(Plate XXVII.)

Fam. MELANIIDÆ.

1. PACHYCHEILUS HIANS, Lea.

2. VIBEX (DORISSA) AQUATILIS, Reeve.

Fam. Ampullariidæ.

3. Pomus spixii, D'Orb.

4. Pomus columbiensis, Sow.

5. Pomus columellaris, Gould.

Fam. Helicidæ.

6. Succinea elongata, Drap.

7. Rumina (Opeas) cuencana, Pfr.

8. Rumina (Opeas) micra, D'Orb.

9. Clausilia (Nena) epistomium, Kust.

10. Solaropsis castelnaui, Hupé.

11. Ammonoceras thomasi, Pfr.

12. Ophiogyra entodonta, Pfr.

13. Bulimus oblongus, Müll.

14. Otostomus (Drymæus) strigatus, Sow.

15. Otostomus (Drymæus) similaris, Moric.

16. Otostomus (Drymæus) saccatus, Pfr.

17. Otostomus (Leiostracus) rectilinearis, Pfr.

18. Otostomus (Leiostracus) gueinzii, Pfr.

19. Tornatellina (Leptinaria) antillarum, Shuttl.

Fam. Limnæidæ.

20. Planorbis (Helisoma) tenagophilus, D'Orb.

21. Planorbis (Helisoma) peregrinus, D'Orb.

22. Planorbis (Spirorbis) anatinus, D'Orb.

Fam. Cyclophoridæ.

23. Cyclophorus crosseanus, Hidalgo.

24. Aperostoma bartletti, sp. nov. (Plate XXVII. figs. 1, 1*a*).

A. *testa late umbilicata, depressa, solidiuscula, confertim plicatulo-striata, sub epidermide fulva albida, ad suturam albo fasciata; spira modice elevata, sutura impressa; anfr.* 6, *convexiusculis, ultimo circa umbilicum costa prominente instructo; apertura obliqua, subcirculari, intus albida; perist. continuo, recto, subacuto, superne angulatim producto, margine columellari subcanaliculato. Operc.* ——?

Diam. maj. 21, min. 19, alt. 14 mill.

25. Bourciera fraseri, Pfr.

Fam. Helicinidæ.

26. Helicina (Oligyra) zephyrina, Ducl.

27. Helicina (Oligyra) rotunda, D'Orb.

Fam. Proserpinidæ.

Genus Cyane, gen. nov.

Testa imperforata, helicinæformis, depresso-globosa, nitida; columella truncata; apertura sublunaris; perist. simplex, rectum.

In *Cyane* the base of the columella is truncate, instead of being furnished with a spiral plait, as in *Ceres* and *Proserpina*; and both the palatal and parietal laminæ are wanting. It appears to be intermediate between *Proserpina* and *Proserpinella*, in which latter genus, according to Mr. Bland, the columellar margin is quite simple.

28. Cyane blandiana, sp. nov. (Plate XXVII. figs. 2, 2*a*.)

C. *testa depresso-globosa, tenui, diaphana, nitida, concentrice minutissime et confertissime punctulato-striata, lutea vel fulva; spira convexo-conoidea, apice obtuso, sutura distincta; anfr.* 5, *vix convexis, ultimo basi paulo convexiore, medio excavato; apertura obliqua, sublunari; columella callosa, leviter arcuata, ad basin truncata; perist. recto, tenui.*

Diam. maj. 8, min. 7, alt. 5¼ mill.

Fam. Unionidæ.

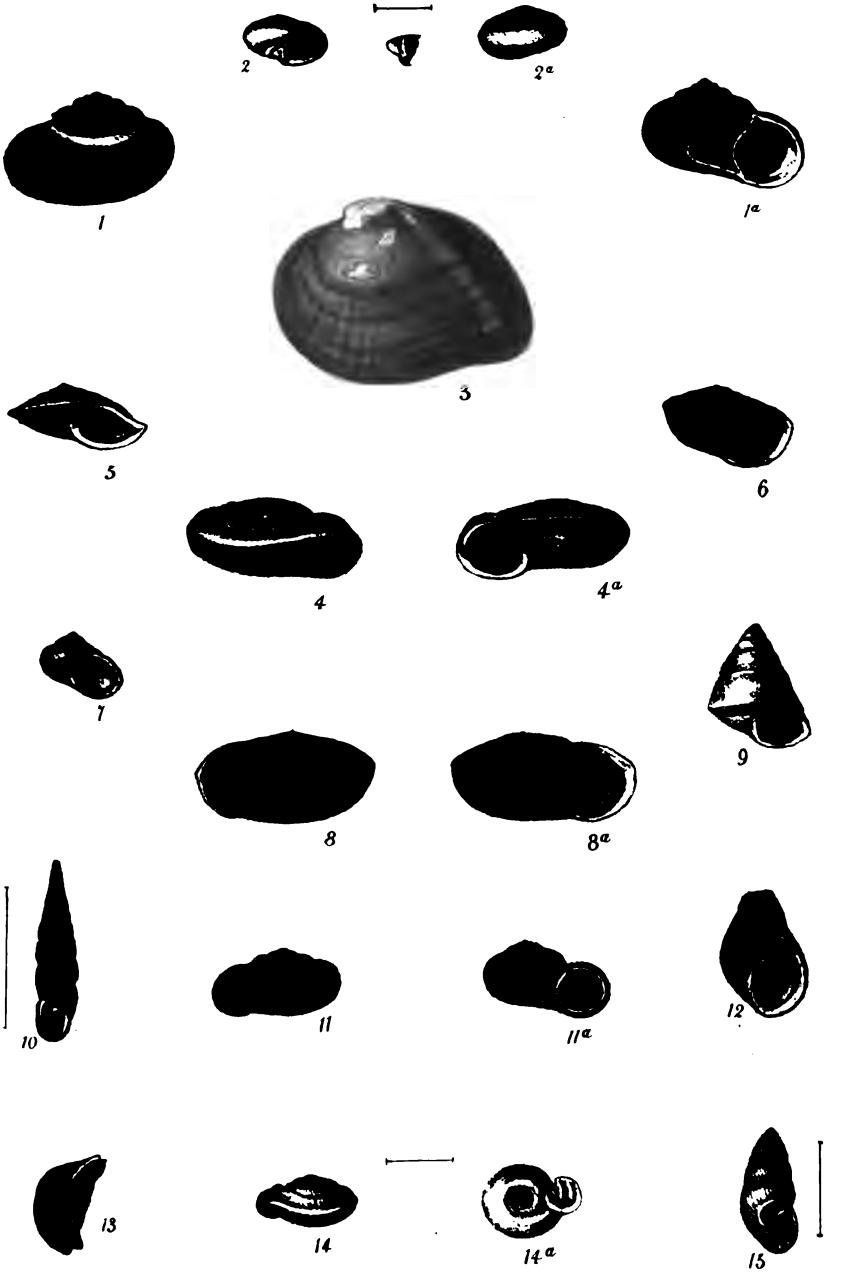
29. Anodonta (Lamproscapha) tenebricosa, Lea.

30. Monocondylæa (Plagiodon) semisulcata, sp. nov. (Plate XXVII. fig. 3.)

M. *testa transversa, ovato-trigona, solida, ventricosa, valde inæquilaterali; margine dorsali arcuato; margine ventrali sinuato; latere antico circulari; latere postico elongato, oblique ovato; umbonibus tumidis, incurvis, erosis; superficie valvarum concentrice rugose striata, ad aream medianam radiatim sulcata, epidermide subrugosa olivaceo-nigra induta; intus margarita alba et iridescente.*

Long. 34, alt. 25, lat. 18 mill.

An example of this species, but of larger size (the result probably of age), and in which the radiating furrows on the valves are almost obsolete, was before obtained by Mr. Bartlett, and in the list of the shells then collected by him, which I communicated to the Society, was referred to by me, with doubt, as *M.* (*Plagiodon*) *isocardioides*, Lea. On comparing, however, the specimens since obtained with Lea's figure and description in the Philadelphia 'Proceedings,' although possessing the same general character, they are, I consider, distinct, Lea's shell being much shorter compared with its altitude, and the surface of the valves being entirely smooth.



G.H.S.werby lith

M & N Hanhart imp.

5. Descriptions of Ten New Species of Land and Freshwater Shells collected by Robert Swinhoe, Esq., in China and Formosa. By Henry Adams, F.L.S.

(Plate XXVII.)

1. Helix (Plectotropis) christinæ, H. Ad. (Plate XXVII. figs. 4, 4*a*.)

H. *testa late et profunde umbilicata, sinistrorsa, tenui, subdiscoidea, oblique irregulariter plicato-striata, sub lente minutissime granulata, albida, supra strigis diffusis fulvis ornata, ad peripheriam albo fasciata, infra fulvo cingulata; spira subplanata, sutura mediocriter impressa; anfr.* 6, *convexiusculis, lente accrescentibus, ultimo antice breviter descendente, angulato, basi convexiore; umbilico conico, anfractus usque ad apicem exhibente, intus fulvo; apertura obliqua, lunari, margine dextro expansiusculo, basali incrassato, expanso.*

Diam. maj. 25, min. 22, alt. 12 mill.

Var. carinifera. *Minor, anfractu ultimo acute carinato; umbilico minore.*

Hab. Ichang and Fungsiang gorges, China.

2. Helix (Plectotropis) mariella, H. Ad. (Plate XXVII. fig. 5.)

H. *testa aperte umbilicata, depresso-lenticulari, tenui, subarcuatim irregulariter rugose striata et sub lente minutissime granulata, pallide fulva; spira paulum convexa, sutura marginata; anfr.* 4½, *ultimo breviter descendente, carinato, carina acuta, compressa, albida, basi convexiore; umbilico mediocri, profundo; apertura perobliqua, angulato-ovali; perist. expanso, albido, marginibus proximis, callo arcuato tenui junctis, basali vix incrassato.*

Diam. maj. 18, min. 16, alt. 7½ mill.

Var. aquila. *Minor, fulva; spira elatiore, anfractu ultimo minus convexo.*

Hab. Ichang and Fungsiang gorges, China.

3. Helix (Acusta) brevispira, H. Ad. (Plate XXVII. fig. 6.)

H. *testa anguste umbilicata, depresso-orbiculata, pertenui, fragili, fulvo-cornea, pellucida, oblique striata; spira brevi, apice obtuso, sutura impressa; anfr.* 5, *subplanatis, ultimo antice non descendente, carinato, subtus tumido; apertura lunari, margine dextro et basali vix expanso, columellari dilatato, reflexo, umbilicum semitegente.*

Diam. maj. 17, min. 15, alt. 11 mill.

Hab. Ichang gorge, China.

4. Helix (Acusta) nora, H. Ad. (Plate XXVII. fig. 7.)

H. *testa perforata, depresso-globosa, tenui, rugose striata, fulvida;*

spira conoidea, apice obtuso, sutura impressa; anfr. 4½, *convexis, rapide accrescentibus, ultimo obsolete angulato, magno, antice descendente, basi subcompresso; apertura ovali, marginibus proximatis, dextro expansiusculo, basali simplici, columellari dilatato, reflexo, perforationem fere occultante.*

Diam. maj. 11, min. 9, alt. 8 mill.

Hab. Ichang gorge, China.

5. Helix (Camena) constantiæ, H. Ad. (Plate XXVII. figs. 8, 8*a*.)

H. *testa umbilicata, depressa, tenui, oblique plicata, rufo-fulva; spira subplanata, apice parum elevato, sutura leviter impressa, submarginata; anfr.* 5½, *planiusculis, ultimo antice non descendente, compresso-carinato, basi convexo; umbilico mediocri, profundo; apertura obliqua, rotundato-lunari; perist. expanso, pallidiore, marginibus conniventibus, callo tenui junctis.*

Diam. maj. 25, min. 21, alt. 13 mill.

Hab. Ichang gorge, China.

6. Helix (Satsuma) albida, H. Ad. (Plate XXVII. fig. 9.)

H. *testa subobtecte perforata, conoidali, tenui, oblique leviter striata et sub lente transverse tenuissime striatula, albida; spira conica, apice obtusiusculo; anfr.* 6, *subplanatis, ultimo carinato, antice non descendente, basi paulum convexo, pone aperturam modice constricto; apertura obliqua, subquadrato-lunari; perist. tenui, expanso, margine dextro flexuoso, basali strictiusculo, columellari superne reflexo, perforationem tegente.*

Diam. maj. 14, min. 12, alt. 15 mill.

Hab. Taiwan, Formosa.

This species, which is allied to *H. japonica*, forms another addition to the section *Satsuma* of A. Adams.

7. Clausilia (Phædusa) bensoni, H. Ad. (Plate XXVII. fig. 10.)

C. *testa breviter rimata, fusiformi, solida, capillaceo-striata, sericea, fulva, ad suturam pallidiore; spira a medio attenuata, apice acutiusculo, sutura anguste marginata; anfr.* 11, *convexiusculis, ultimo angustiore, subsoluto; apertura verticali, subpyriformi; lamella supera marginali, infera profunda, furcata; lunella imperfecta; plicis palatalibus pluribus, suprema elongata; perist. continuo, albo, expanso et reflexiusculo.*

Long. 18, diam. 4 mill.

Hab. Ichang gorge, China.

8. Cyclotus taivanus, H. Ad. (Plate XXVII. figs. 11, 11*a*.)

C. *testa umbilicata, suborbiculata, tenui, striatula, sublævigata, rufo-brunnea, superne strigis fulguratis castaneis obliquis picta, et ad peripheriam unifasciata; spira brevi, apice prominulo; anfr.* 4½, *convexis, ultimo descendente; umbilico lato, perspectivo; apertura parum obliqua, circulari, intus fusco-violacea; perist. continuo,*

subduplicato, interno brevi, recto, ad marginem columellarem subcontinuo, externo annulato, expanso. Operc. normale.

Diam. maj. 16, min. 14, alt. 9½ mill.

Hab. Taiwan, Formosa.

9. MELANIELLA BREVICULA, H. Ad. (Plate XXVII. fig. 12.)

M. *testa ovoidea, decollata, solidula, longitudinaliter oblique striata et lineis nonnullis vix elevatis cincta, olivaceo-fusca, interdum nigro-castaneo fasciata; spira anfr. superstitibus 3, convexiusculis, sutura impressa; anfractu ultimo inflato; apertura ampla, pyriformi, antice producta, testæ longitudinis ⅔ æquante; intus cærulescente; columella callosa, alba.*

Long. 17, lat. 10 mill.

Hab. Amoy, China.

10. DREISSENA SWINHOEI, H. Ad. (Plate XXVII. fig. 13.)

D. *testa solidiuscula, arcuatim triangulo-cordiformi, nitida, plicis rugosis, irregularibus, concentricis et costis medianis paucis radiantibus munita, castanea; apicibus terminalibus, proximis, compressis; valvis fastigio umbonali valde elevato, acuto, sinuato; margine dorsali arcuato, portione ligamentali recta; margine ventrali incurvato, in medio hiante; intus livescente.*

Long. 14, lat. 9, alt. 5 mill.

Hab. On rocks in the Yangtsze river at Kweifoo, China.

6. Descriptions of Two New Species of African Land Shells. By HENRY ADAMS, F.L.S.

(Plate XXVII.)

1. HELIX (CORILLA) DAMARENSIS, H. Ad. (Plate XXVII. figs. 14, 14*a*.)

H. *testa umbilicata, discoidea, solidula, oblique confertissime capillaceo-striata, supra albido-fulva, infra albida, ad peripheriam pallide fulvo fasciata; spira convexa, apice obtuso, sutura impressa; anfr. 6, convexiusculis, ultimo antice soluto, subito descendente, peripheria subcostato-carinato, basi convexo, juxta aperturam compresso; apertura perobliqua, angulato-circulari; perist. continuo, late expanso, lamina parietali valida intrante et dentibus tribus obtusis profundis illi oppositis munito.*

Diam. maj. 9, min. 7, alt. 4 mill.

Hab. Damara Land, South-west Africa (*Coll. Angas*).

This species is closely allied to *H. sculpturata*, Gray, which is from the same locality.

2. ENNEA (GONOSPIRA) RINGENS, H. Ad. (Plate XXVII. fig. 15.)

E. *testa rimata, fusiformi, ovata, solida, longitudinaliter confertim*

striata, albida; spira elongato-conica, apice acutiusculo, sutura anguste marginata; anfr. 8, *convexiusculis, ultimo* ½ *longitudinis, antice ascendente, basi compresso, pone aperturam trisulcato; apertura subverticali, reniformi, ringente; columella profunde tridentata; perist. continuo, expanso, ad parietem appresso, lamina valida intrante juxta angulum parietis; margine columellari late, profunde et depresse sinuato; margine dextro superne sinuato, lamellis pluribus, quarum* 4 *longioribus, intrantibus munito.*

Long. 14, diam. 6 mill.

Hab. Sierra Leone, West Africa (*Coll. E. Higgins*).

This species is somewhat near *E. cyathostoma*, Pfr., from Old Calabar, and is peculiar from the deep and depressed sinus in the left margin of the aperture.

DESCRIPTION OF PLATE XXVII.

Fig. 1, 1*a*. *Aperostoma bartletti*, p. 375.
2, 2*a*. *Cyane blandiana*, p. 376.
3 *Monocondylæa* (*Plagiodon*) *semisulcata*, p. 376.
4, 4*a*. *Helix* (*Plectotropis*) *christinæ*, p. 377.
5. —— (*Plectotropis*) *mariella*, p. 377.
6. —— (*Acusta*) *brevispira*, p. 377.
7. —— (*Acusta*) *nora*, p. 377.
8, 8*a*. —— (*Camena*) *constantiæ*, p. 378.
9. —— (*Satsuma*) *albida*, p. 378.
10. *Clausilia* (*Phædusa*) *bensoni*, p. 378.
11, 11*a*. *Cyclotus taivanus*, p. 378.
12. *Melaniella brevicula*, p. 379.
13. *Dreissena swinhoei*, p. 379.
14, 14*a*. *Helix* (*Corilla*) *damarensis*, p. 379.
15. *Ennea* (*Gonospira*) *ringens*, p. 379.

June 9, 1870.

George Busk, Esq., F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of May:—

The total number of registered additions to the Society's Menagerie during the month of May 1870 was 200, of which 45 were by birth, 54 by presentation, 83 by purchase, and 18 were animals received simply on deposit. The total number of departures during the same period, by death and removals, was 75, showing a net addition of 125 individuals to the collection during the month.

The most noticeable arrivals during the month were:—

1. A male Deer, received May 5th along with a collection of other animals transmitted to the Society from Singapore by H.R.H. the Duke of Edinburgh. This Deer, of which the exact locality has



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CERVUS ALFREDI.

not as yet been ascertained, is certainly different from any other Deer of which we have previously received living examples, nor am I able, after diligent search, to find any described species to which it can be referred. It is obviously most nearly allied to the *Cervus axis*, but is at once distinguishable by its smaller size, smaller ears, and general colour, which is of a dark chocolate. Under these circumstances I propose to confer upon it a temporary specific name, and to call it, after His Royal Highness the Prince who has sent it home,

CERVUS ALFREDI. (Plate XXVIII.)

General shape and appearance that of a small *Cervus axis*, but of a nearly uniform dark chocolate-brown colour, darker round the breast; whole sides of body ornamented with about six rows of not very distinctly marked pale yellowish spots; dorsal line and upper surface of tail not spotted; belly and under surface of limbs and throat pale yellowish brown, or fawn-colour. Head pale brown, darker between the horns; outer surface of ears black, sparingly covered with hair; inner surface of ears rather thickly covered with whitish hairs. Orbital sinus large and well developed, and surrounded with blackish hairs. Ears short and small. Muffle naked, wide, and very moist. Chin and upper part of throat pale yellowish white. Gland on metatarsus indicated by a small spot. Height 2 feet 6 inches; length of ear, from opening to tip, $3\frac{1}{4}$ inches; length of tail $3\frac{1}{2}$ inches.

Hab. Malayan peninsula, or adjoining islands (?).

Viv. Soc. Zool. Londin.

2. Three Bladder-nosed Seals (*Cystophora cristata*). On the 6th inst. we obtained by purchase, out of a whaling ship that had come into Dundee, two males and one female of the Bladder-nosed Seal (*Cystophora cristata*), of which I am not aware that living examples have previously been exhibited alive in this country. These animals are all quite young, but still show marked differences in colouring and in other particulars from the species of the genus *Phoca*. The curious inflation of the nose is at present but very slightly developed, but may nevertheless be observed occasionally when the head is protruded from the water.

3. Two Bernier's Ibises (*Ibis bernieri*) from Madagascar, obtained by purchase from the Société d'Acclimatation of Paris. The Sacred Ibis of Madagascar has been generally united to the *Ibis æthiopica* (s. *religiosa*) of the African continent*. Judging, however, by the present examples, there would appear to be ample grounds for specific distinction. The Madagascar bird, as will be apparent from the sketch now exhibited, and as any one who will take the trouble to examine the living birds will see more plainly, is at once distinguishable by the much less extent of the naked black skin upon the head (the white feathers ascending nearly to the top of the neck), by the longer and slenderer bill, and by the *white* iris. In the numerous specimens of *Ibis æthiopica* that have been in the Society's Gardens

* *Cf.* Finsch et Hartl. Vög. Ostafr. p. 733.

Fig. 1.



Ibis bernieri.

Fig. 2.



Ibis æthiopica.

the iris has been invariably black. Under these circumstances I propose to adopt for the Madagascar bird the name Bonaparte has suggested for it (Consp. ii. p. 151). I may remark that M. Grandidier (Rev. et Mag. de Zool. 1868, p. 1) speaks of the Madagascar bird as a variety, and mentions its white iris and some other minor differences.

4. Two Guineafowls, received on the same day from the Société Zoologique d'Acclimatation, belonging to the section allied to *Numida cristata*, forming the genus *Guttera* of Wagler. These are the typical specimens on which Mr. Elliot (Ibis, 1870, p. 300) has established his *Numida verreauxi*, and will form the subjects of his figures of this species in his forthcoming work on the *Phasianidæ*. The locality from which these specimens were obtained is said to have been Natal.

5. A Black-headed Conure (*Conurus nandaya*), probably from Paraguay or the upper La Plata, being the first example of this scarce Parrot that I have ever seen alive.

6. A young male of the Black Wallaroo (*Osphranter robustus*, Gould, Mamm. of Austr. ii. pl. 11), being, as I believe, the first individual of this fine large Kangaroo that has reached the Society's Gardens alive. This animal was obtained by purchase from Mr. Hagenbeck, of Hamburg, on the 16th of May.

7. A male of the very singular Huia-Bird of New Zealand (*Heteralocha gouldi* *), obtained by purchase on the 18th of May. Much interest attaches to this form on account of the extraordinary variation of the bill in the two sexes. We may hope that an anatomical examination of this bird, when it dies, may enable us to decide as to its place in the Natural System, which has hitherto been undetermined. Judging from external appearance, I should be inclined to place it either with the *Corvidæ* or with the *Meliphagidæ*.

The present specimen is said to have been obtained in the interior of the North Island, sixty miles north of Wellington.

8. A Tuatera Lizard (*Sphenodon punctatum*), purchased May 20th. A specimen of this extraordinary Lizard has been once before living in the Society's Gardens, having been deposited there by Dr. Günther in 1868†. The present specimen is said to have been obtained from one of the islands on the northern coast of the island, probably one of those mentioned in Dr. Bennett's note (P. Z. S. 1869, p. 227).

9. Three Buff Laughing Kingfishers (*Dacelo cervina*, Sharpe, Monogr. *Alced.* pt. 8), from North Australia, being the first examples of this species ever brought alive to Europe.

10. An example of a rare Macaque (*Macacus ocreatus*), purchased May 31st. This Monkey seems never yet to have been obtained by any collector; and its exact locality is unknown, though I suspect it to be from Celebes or from one of the Philippines. It is figured in these 'Proceedings' (1860, p. 420, pl. LXXII.), and in Wolf and Sclater's 'Zoological Sketches' (ii. pl. 1).

* *Neomorpha gouldi*, Gould, B. of Austr. iv., pl. xix.

† See P. Z. S. 1868, p. 530.

Prof. Newton, V.P., exhibited a series of large Falcons from Alaska, sent to him for determination by Prof. Baird, For. Memb., Assistant-Secretary of the Smithsonian Institution. Some uncertainty had hitherto prevailed as to the form of large Falcon which inhabited the north-west of America, or indeed any of the territory lying to the west of Hudson's Bay; but it would appear likely, from the statement of Richardson (Faun. Bor.-Am. ii. p. 28), that in some parts at least of that tract *Falco candicans* breeds. The birds from Alaska Prof. Newton referred without doubt to *F. islandicus*, though belonging to the darker phase of that form. He also adverted to the fact that in the lately published list of Alaskan birds by Messrs. Dall and Bannister* this large Falcon was included under the name of *Falco sacer*, Forst. (Phil. Trans. 1772, pp. 383, 423), remarking that, as had been previously shown (Ibis, 1862, p. 51, note), the species to which this name referred was certainly not a *Falco* at all as the genus is now restricted, and that, if Forster's diagnostic character, "*iris yellow*" (on which great stress was laid), could be trusted at all, the bird was most likely that which is generally known as *Astur atricapillus*.

Mr. Gould exhibited, and made remarks on, some specimens of Water-ouzels (*Cinclus*) killed in Norfolk, pointing out that these birds differed from the ordinary *Cinclus aquaticus* of Scotland, Wales, and Ireland, and agreed with the Scandinavian form called *Cinclus melanogaster*†.

Dr. J. Hawkes, F.Z.S., communicated a note on a case of hernia ventriculi in a common Canary-Finch (*Crithagra canariensis*).

The following papers were read:—

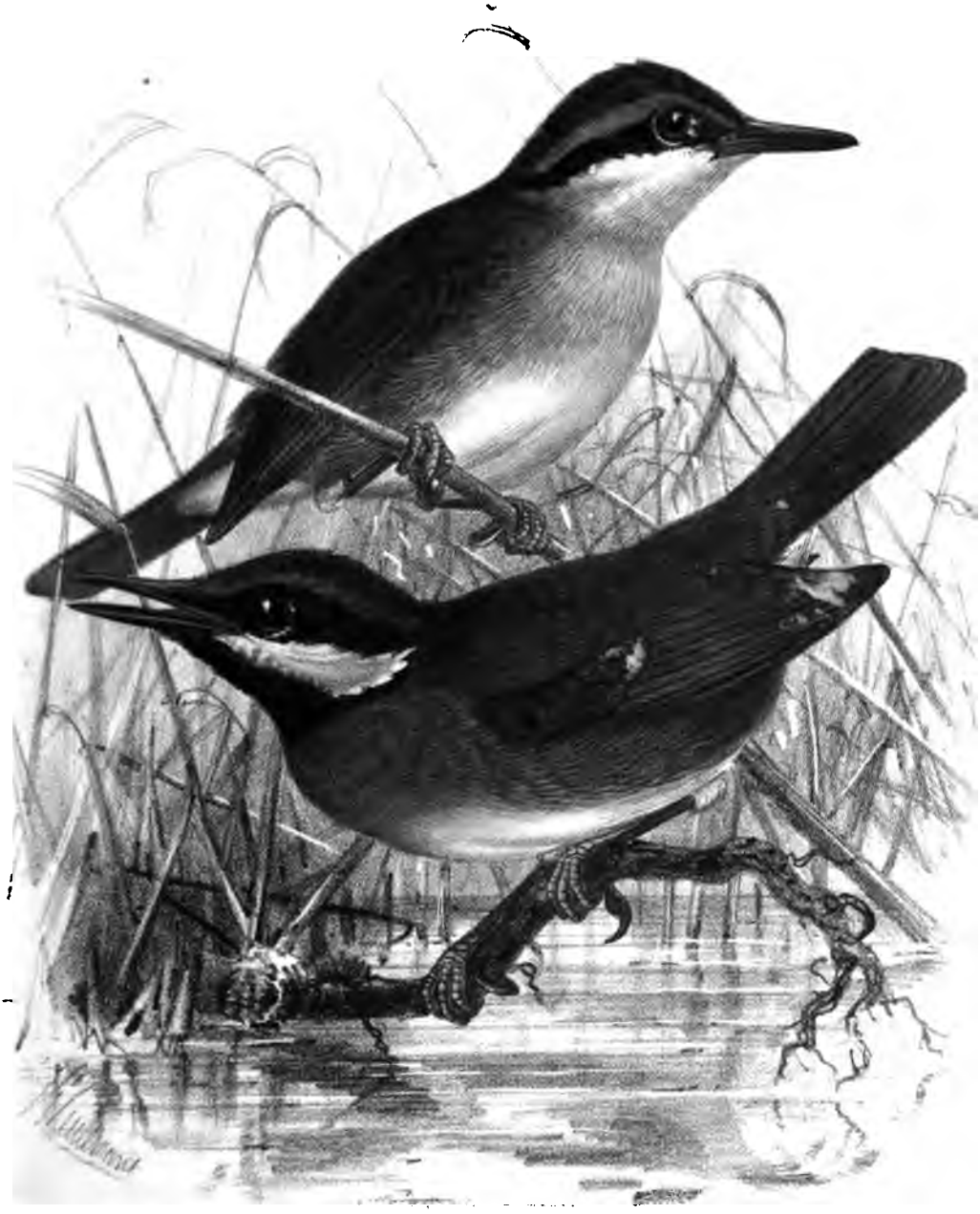
1. Contributions to the Ornithology of Madagascar.—Part I. By R. B. Sharpe, F.L.S., Libr. Z.S., &c.

(Plate XXIX.)

I have recently been favoured by Mr. Cutter, Natural-History Agent, of 35 Great Russell Street, Bloomsbury, with the inspection of a collection of birds formed by Mr. A. Crossley in the northern portion of Madagascar. Ornithologists are greatly indebted to Mr. C. Ward of Halifax, who, at his own expense, equipped Mr. Crossley for this expedition. As might be expected from the list of birds furnished by M. A. Grandidier (Rev. et Mag. de Zool. 1867, pp. 319, 353, 385, 417), the ornithology of this portion of Madagascar is of great interest; and I have therefore put together a few notes on the birds contained in the present consignment. Before I saw the collection, the British Museum had made their selection and had secured seve-

* Transactions of the Chicago Academy of Sciences, i. p. 271 (1869).

† *Cf.* Stevenson's Birds of Norfolk, i. p. 69; and Salvin in Ibis, 1867, p. 115. —Ed.



MYSTACORNIS CROSSLEYI.



ral unique specimens; but on my expressing a wish to be allowed to include in the present paper the names of the birds taken by the Museum, Mr. George Robert Gray not only very kindly showed me the whole of the skins obtained by him, but, on finding that I described two of them as new, he most handsomely withdrew the names he was himself intending to bestow on them in favour of mine. I have only to return him my best thanks for the assistance he has rendered to me in its preparation. To Professor Newton my thanks are due for lending me several rare specimens of Madagascar birds for comparison.

Mr. Cutter informs me that Mr. Crossley first made a trip into the province of Vohima, in the northern corner of the island; but on this excursion he does not seem to have collected many birds. Afterwards returning to Tamatave, he proceeded inland to Antananarivo and thence northwards to Nossi Vola, which, he informs me, is to the south-east of Lake Alout. Here, and at Saralalan, a place about seven or eight miles to the eastward of Nossi Vola, most of the birds were collected.

I have referred to the following works and papers in the course of the present essay.

1. Dr. Hartlaub's Ornithologischer Beitrag zur Fauna Madagascar's, 8vo. Bremen, 1861.

2. Notes on Birds observed in Madagascar. By S. Roch and E. Newton. (Part I., Ibis, 1862, p. 265; Part II., Ibis, 1863, p. 165.)

3. On the Mammals and Birds collected in Madagascar by Dr. Charles Meller. By P. L. Sclater, M.A. &c. (P. Z. S. 1863, p. 160)

4. Notes on a second visit to Madagascar. By Edward Newton, C.M.Z.S. (Ibis, 1863, pp. 333, 452.)

5. List of Animals collected at Mohambo, Madagascar, by Mr. W. T. Gerrard. By Alfred Newton, M.A. &c. (P. Z. S. 1865, p. 832.)

6. Notes sur les Mammifères et les Oiseaux observés à Madagascar, de 1865 à 1867, par Alfred Grandidier. (Rev. et Mag. de Zool. 1867, pp. 319, 353, 385, 417.)

7. Recherches sur la Faune de Madagascar et de ses dependances d'après les découvertes de Fr. P. L. Pollen et D. C. van Dam. 2de partie. Mammifères et Oiseaux, par H. Schlegel et Fr. P. L. Pollen, 4to. Leyde, 1868.

Fam. Turdidæ.

1. Hypsipetes ourovang.

Hypsipetes ourovang (Gm.); Hartl. Faun. Madag. p. 44 (1861); Roch and E. Newt. Ibis, 1862, p. 273; Scl. P. Z. S. 1863, p. 163; E. Newt. Ibis, 1863, p. 347; A. Newt. P. Z. S. 1865, p. 835; Grand. Rev. et Mag. de Zool. 1867, p. 359.

Hypsipetes urovang, Schl. & Poll. Faun. Madag. Ois. p. 296 (1868).

2. Tylas eduardi.

Tylas eduardi, Hartl. P. Z. S. 1862, p. 152, pl. xviii.

Tylas eduardsi (*err.*), Grand. Rev. et Mag. de Zool. 1867, p. 359.

Turdus goudoti, Verr. Nouv. Arch. i. p. 77, pl. v. fig. 2 (1866).

"Nossi Vola. Native name *Kankimave*."

"Female. Saralalan, Nov. 19th, 1869. Local."

M. Grandidier (*l. c.*) states that the original specimen of this species was not adult, and that the birds obtained by him in Madagascar differed materially from the description given by Dr. Hartlaub. The specimens procured by Mr. Crossley seem to be intermediate in plumage between the type specimen and the bird figured (*l. c.*) as *Turdus goudoti*, but do not have the white collar so distinct. If, as M. Grandidier asserts, the original *Tylas eduardi* is a young bird, we may conclude that the white collar is characteristic of the old bird.

I would remark upon what appears to be a curious case of mimicry in regard to this species, as compared with *Vanga polleni*, Schl. (Faun. de Madag. Ois. p. 174: 1868). The specimen before me agrees very well with the description given by the learned Professor; and I really supposed I had a specimen of *Vanga polleni* before me, till Professor Newton identified the bird as *Tylas eduardi*. All I can say is that, if *Tylas eduardi*, Hartl., and *Vanga polleni* are two distinct species, we have a case of mimicry which is almost unrivalled for interest; for it is evident that the Shrike assumed the plumage of the more peaceful Thrush because it doubtless served him well in pursuit of his prey.

Fam. Timaliidæ.

Oxylabes, gen. nov.

Rostrum elongatum, apicem versus compressum; maxilla mandibulam paullo superante: dertro recto, apice decurvato: gonyde ascendente setis brevibus ad basin mandibulæ: naribus ovalibus supra parvo membrano obtectis.

Alæ rotundatæ, remige primo brevi, secundo et tertio gradatim longioribus; quarto, quinto, sexto et septimo æqualibus et longissimis.

Cauda longa, rectricibus duodecim, externa brevissima, duabus proximis gradatim longioribus, sex mediis longissimis et subæqualibus.

Pedes robustissimi, unguibus validis; tarso scutellato, digito exteriore quam interior paullo longiore, halluce ambos superante.

The subjoined woodcut illustrates the characters of this new genus. The type is

3. Oxylabes madagascariensis.

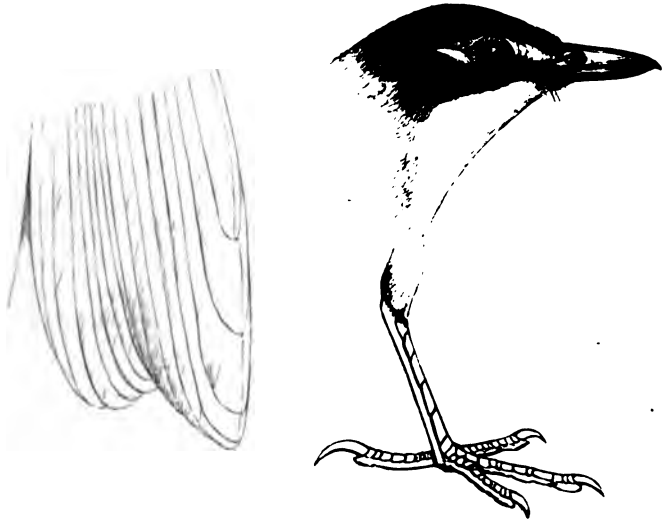
Ellisia? madagascariensis (Briss.); Hartl. Faun. Madag. p. 37 (1861).

"Nossi Vola. Native name *Cerun-cerun*. Eye brown. Contents of stomach insects."

This bird appears to me to be without doubt the *Rossignol de Madagascar* of Brisson; and Professor Newton, who compared the

birds along with me with Brisson's description, agrees that we must have here the species described by him. The only point in which it does not absolutely agree is in the white spot behind the eye, which Brisson describes as fuscous; and he takes no notice of the white lores. This, however, will not warrant us in supposing that the present bird is not identical with the species described by Brisson, as will be seen from the following facts. I have now two specimens before me which differ from each other in some respects. In one the rufous on the head and breast is very distinct and pure, the lores and the spot behind the eye very pure white, as also the throat. This I take to be the adult male. The other bird is altogether duller in plumage, the spot behind the eye very small and dirty white in colour, while the lores are of such a dull white as hardly to be distinguished from the sides of the head, and I do not think could possibly be so, if the skin were not very carefully prepared. This specimen, which I take to be the female bird, agrees admirably with the descriptions of Brisson and Hartlaub.

Fig. 1.



Oxylabes madagascariensis.

I subjoin the descriptions of two birds now before me.

Male (?). Head rich sienna, obscurely fringed with brown on the forehead; lores and a spot behind the eye pure white; ear-coverts duller sienna; upper surface of the body olive-green, inclining to rufous on the sides of the neck; quills pale greyish brown, margined exteriorly with olive-green, especially the secondaries, the innermost of which are entirely of a dull olive-green colour; tail dull

olive-green, rather lighter on the under surface; throat pure white; upper part of the breast and centre of the abdomen pale rufous, becoming lighter on the latter; flanks olive-green; bill dark horn-brown, nearly black on the upper mandible and on the basal half of the lower mandible; the tip of the latter and edge of the former pale yellowish white; legs dark horn-brown, claws light brown. Total length 6·3 inches; of bill from front 0·6, from gape 0·88; wing 2·7; tail 2·5; tarsus 0·9.

Female (?). Generally similar to the last, but somewhat duller and more greenish on the upper surface; the head obscurely marked with dark brown, and the sienna of the head not well defined; the lores and the spot behind the eye dirty white and indistinct; throat white tinged with yellow; the rufous of the breast paler, less extended, and the middle of the abdomen yellowish olive. Total length 6·2 inches; of bill from front 0·6; wing 2·5; tail 2·45.

Fam. Nectariniidæ.

4. Nectarinia souimanga.

Nectarinia souimanga (Gm.); Hartl. Faun. Madag. p. 52 (1861); Roch and E. Newt. Ibis, 1862, p. 272; Scl. P. Z. S. 1863, p. 162; E. Newt. Ibis, 1863, p. 342; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 355; Schl. & Poll. Faune Madag. p. 70 (1868).

Several specimens of this Sun-bird were in the collection.

Fam. Hirundinidæ.

5. Phedina madagascariensis.

Phedina madagascariensis, Hartl. Faun. Madag. p. 27 (1861).
Hirundo borbonica, Schl. & Poll. Faun. Madag. Ois. p. 68 (1868).

"Nossi Vola, Oct. 19th and 28th, 1869. Native name *Chiden Chiden*. Eyes brown. Three eggs. Local."

Dr. Hartlaub (*l. c.*) separates the Madagascar *Phedina* from the true *Ph. borbonica*, on account of its being somewhat lighter-coloured, having a longer wing and tarsus, and also on account of its almost uniform white under tail-coverts. Professor Schlegel (*l. c.*) indorses Dr. Hartlaub's opinions to some extent, but observes that the difference of size mentioned by the worthy doctor was only accidental, but that the coloration of the Madagascar birds was somewhat lighter, and especially with regard to the whiter under tail-coverts.

Mr. Crossley brought two specimens, both differing in extent of colour from a Mauritius specimen given me by Professor Newton. The Madagascar birds are certainly lighter in colour; but, as regards size, they are, if anything, smaller than the one from the Mauritius. I notice one difference, however, in the tail-coverts which seems to have escaped the attention of both Dr. Hartlaub and Professor Schlegel; this is that, in addition to the much whiter colour of the under tail-

coverts in the Madagascar bird, they seem to be a good deal longer than in the species from Mauritius. This may be accidental and exist in my specimens alone, but, if found to be constant, would add another link in the present very slight chain of evidence as to the specific distinctness of the two birds. A full description of my Madagascar specimens is given in my paper on the African Swallows (P. Z. S. 1870, p. 296).

Fam. Muscicapidæ.

6. Terpsiphone mutata.

Tchitrea holosericea (Temm.); Hartl. Faun. Madag. p. 45 (1861).

Tchitrea mutata (Linn.); Hartl. Faun. Madag. p. 45 (1861); Scl. P. Z. S. 1863, p. 163; A. Newt. P. Z. S. 1865, p. 835; Grand. Rev. et Mag. de Zool. p. 385.

Muscipeta mutata, Schl. & Poll. Faun. Madag. Ois. p. 76 (1868).

Tchitrea pretiosa, Less.; Hartl. Faun. Madag. p. 46 (1861); E. Newt. Ibis, 1863, p. 347.

"Nossi Vola, Oct. 22nd, 1869. Native name *Skate*. Eyes black or dark blue."

The changes which this species goes through are wonderful. Specimens in all stages of plumage are contained in the present collection, exhibiting all the differences portrayed by Professor Schlegel in his plates (*l. c.*).

Fam. Laniidæ.

7. Ceblepyris major, sp. n.

C. *affinis* C. canæ, *sed conspicue major, coloribus saturatioribus, et rectricibus albo latiore marginatis.*

The specimens sent by Mr. Crossley are very much larger than ordinary specimens of *Campephaga cana*; and both Mr. G. R. Gray and Professor Newton agree with me that the species is distinct from the bird collected by Messrs. Pollen and Van Dam in N.E. Madagascar, of which we have a considerable series in this country. In the last-mentioned birds the wing measures barely 4 inches in length, while in the specimens just received it reaches 4·4 inches, and, in addition to the longer wing, the whitish-grey tips to the tail-feathers are very much broader.

8. Artamia viridis.

Leptopterus viridis (Gm.); Hartl. Orn. Madag. p. 48 (1861); Roch and E. Newt. Ibis, 1862, p. 273; E. Newt. Ibis, 1863, p. 348; A. Newt. P. Z. S. 1865, p. 835.

Artamia viridis, Grand. Rev. et Mag. de Zool. 1867, p. 386; Schl. & Poll. Faun. Madag. Ois. p. 84, pl. 27.

"Saralalan, Nov. 20th, 1869. Native name *Vorun sasat*."

I cannot perceive any characters whereby the present bird may be generically separated from *Artamia leucocephala*, the type of the genus *Artamia*.

9. CALICALICUS MADAGASCARIENSIS.

Calicalicus madagascariensis (Linn.); Hartl. Faun. Madag. p. 50 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 386.

Lanius madagascariensis, Schl. & Poll. Faun. Madag. Ois. p. 99.

Hylophorba ruticilla, Scl. P. Z. S. 1865, p. 326, pl. 12.

"Nossi Vola, Nov. 13th, 1869, and Saralalan, Nov. 18th, 1869. Native name *Tit k'rush*. Eyes dark blue."

Mr. Crossley has sent two males. This bird appears to be rare in collections, and was not obtained by Mr. Edward Newton or his companions. M. Grandidier states that it is only found in the woods, singly or in pairs.

10. DICRURUS FORFICATUS.

Dicrurus forficatus (Linn.); Hartl. Faun. Madag. p. 49 (1861); Roch & E. Newt. Ibis, 1862, p. 274; E. Newt. Ibis, 1863, p. 348; Scl. P. Z. S. 1863, p. 163; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 386; Schl. & Poll. Faun. Madag. Ois. p. 79.

"Nossi Vola. Eyes red. Native name *Ry-luv*."

Every one interested in the *Dicruridæ* should read the entertaining account of the habits of the present bird, as detailed by Messrs. S. Roch, E. Newton, Pollen, and Van Dam, the particulars adduced by the last-named authors being especially worthy of perusal. The habits, mode of breeding, and form of nest are thoroughly Shrike-like.

All the specimens sent by Mr. Crossley were in fine condition, the plumage being especially bright and glossy. I have also in my collection a specimen from Madagascar, purchased from the "Maison Verreaux;" but the exact part of the island in which it was collected is not specified. This bird is somewhat smaller, has a much slighter crest, and has the whole plumage less bright; indeed it would seem to constitute a small race of *Dicrurus forficatus*. This is worth noticing, though no one would wish, in the face of the difference of measurements brought forward by Professor Schlegel as occurring in specimens from the same locality, to separate the two birds as distinct species.

Fam. ZOSTEROPIDÆ.

11. ZOSTEROPS MADAGASCARIENSIS.

Zosterops madagascariensis (Linn.); Hartl. Faun. Madag. p. 40 (1861); Scl. P. Z. S. 1863, p. 163; E. Newt. Ibis, 1863, p. 346; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 357; Schl. & Poll. Faun. Madag. p. 71, pl. 19 (1868).

"Tamatave."

Fam. SYLVIADÆ.

12. EROESSA TENELLA.

Eroessa tenella, Hartl. P. Z. S. 1866, p. 219; Grand. Rev. et

Mag. de Zool. 1867, p. 357; Schl. & Poll. Faun. Madag. Ois. p. 92, pl. 18 (1868).

This bird is beautifully represented in Professor Schlegel's plate in the 'Faune de Madagascar;' and he states in this work that in the form of its beak it resembles *Zosterops* and the *Phylloscopi* in style of coloration, but that the wings present a very different conformation, approaching rather in this respect the genera *Calicalicus* and *Newtonia*. In my opinion, however, its nearest allies are the South-African genera *Eremomela* and *Dryodromas*, it being, indeed, very close indeed to the latter genus, as appears from a comparison of *Eroessa tenella* with *Dryodromas flavidus*. Both genera possess well-marked hairy tufts on the feathers of the nape, this peculiarity being very prominent in *Eroessa*, less developed in *Dryodromas*, and apparently altogether wanting in *Eremomela*. The tarsus, moreover, is long and the leg robust in *Dryodromas*, but is altogether different from that of *Eroessa*, where the foot is small and weak and the tarsus short.

13. CISTICOLA MADAGASCARIENSIS.

Drymœca madagascariensis, Hartl. Faun. Madag. p. 53 (1861, descr. orig.); Roch & E. Newt. Ibis, 1862, p. 272; E. Newt. Ibis, 1863, p. 343; Scl. P. Z. S. 1863, p. 162.

Cisticola madagascariensis, A. Newt. P. Z. S. 1865, p. 835; Grand. Rev. et Mag. de Zool. 1867, p. 357; Schl. & Poll. Faun. Madag. Ois. p. 91 (1868).

"Nossi Vola. Native name *Chinsen*."

14. ELLISIA TYPICA.

Ellisia typica, Hartl. Faun. Madag. p. 37 (1861); E. Newt. Ibis, 1863, p. 344; Scl. P. Z. S. 1863, p. 162; A. Newt. P. Z. S. 1865, p. 835; Grand. Rev. et Mag. de Zool. 1867, p. 358.

Drymœca ellisii, Schl. & Poll. Faun. Madag. Ois. p. 91, pl. 28. fig. 2 (1868).

"Nossi Vola. Nov. 10th, 1869. Eyes brown. Insects in the stomach."

I am not sure that a detailed English description of the present bird has ever been furnished; and as diagnoses in our own language are always useful as an auxiliary help to the determination of any species, I subjoin the description of a fine specimen sent by Mr. Crossley in the present collection.

Above olive-brown, inclining to green on the head and nape, but becoming decidedly brown on the rump and upper tail-coverts; quills brownish black, margined exteriorly with olive-brown, especially on the secondaries, which are almost entirely of this colour, but are very dark; tail dark brown, with cross bands which are only conspicuous in certain lights, the shafts of the feathers black above, whitish brown beneath; lores yellowish; cheeks and ear-coverts brown varied with yellowish; throat whitish, on the lower part a few longitudinal dull brown markings; rest of the un-

der surface of the body dusky olive-brown, yellowish down the centre; edge of the carpal joint yellowish white, bill horn-brown, the lower mandible yellow; feet horn-brown, claws pale yellowish brown. Total length 6·2 inches; of bill from front 0·5; wing 2·4; tail 2·9; tarsus 0·8.

The intensity of the yellow on the throat and olive-brown on the under parts varies in specimens. In the female bird mentioned by Mr. E. Newton (*l. c.*), and the specimen of which has been lent to me by Professor Newton, the throat is nearly white, the longitudinal marks on the upper part of the breast very distinct, and the abdomen pale yellowish olive, all the colours being clearer than in the specimens in my own collection.

I would here remark that *Drymœca morelii*, Pollen (Gray's 'Hand-list,' no. 2748), is the present bird (*l. c.* no. 2845). This oversight, which was pointed out to me by Mr. Gray himself, is not due to any fault of his, as the following facts will show. In the course of last year Mr. Gray received from Mr. Pollen a specimen of *Ellisia typica*, labelled in Mr. Pollen's own handwriting *Drymœca morelii*; and being at work on his 'Hand-list' at the time, he placed the bird in the genus *Drymœca*, supposing that the description was published in Holland and would in due time make its appearance in this country. No description, however, appeared, the bird being afterwards recognized to be *Ellisia typica** by Mr. Pollen; but the names had already been printed before the mistake could be rectified.

MYSTACORNIS (nov. gen. Sylviidarum).

Rostrum gracile, elongatum, compressum, dertro recto, gonyde versus apicem paullo ascendente, setis rictalibus nullis; naribus oblongis linearibus.

Alæ moderatæ, rotundatæ, remige primo brevi, secundo et tertio gradatim longioribus, quarto, quinto et sexto æqualibus et longissimis.

Cauda fere quadrata, rectricibus 10, *mediis paullulo longioribus.*

Pedes graciles, tarso longo, haud scutellato; digitis lateralibus subæqualibus, exteriore ad basin medio conjuncto; unguibus debilibus.

This genus comes very near to *Tatare* and *Macrosphenus*, but has the bill more compressed, and may at once be distinguished by the absence of all rictal bristles.

The name *Mystacornis* was suggested to me by Mr. G. R. Gray; and I have adopted it, as it well expresses the configuration of the head of the typical species.

15. MYSTACORNIS CROSSLEYI. (Plate XXIX.)

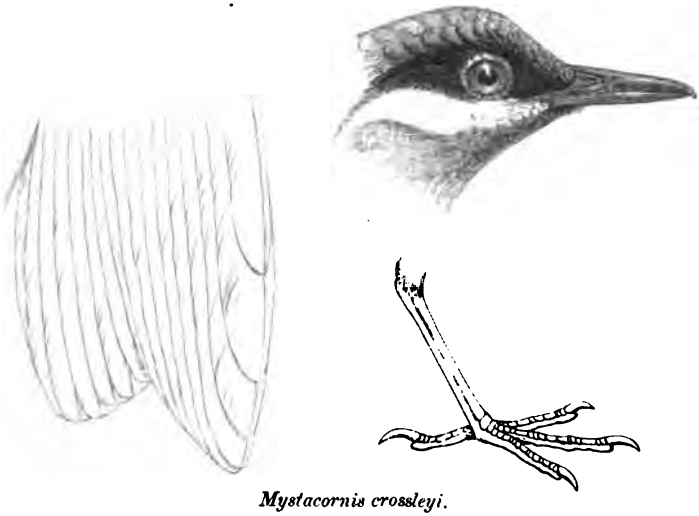
Bernieria crossleyi, Grand. Rev. et Mag. de Zool. 1870, p. 50.

* Exactly the same circumstances will account for *Saxicola arborea*, Pollen (Gray's 'Hand-list,' no. 3280), which is *Newtonia brunneicauda* (*l. c.* no. 4846), appearing in the 'Hand-list.'

♂ ad. M. *supra olivaceus, fronte et capitis lateribus ardesiacis: linea lata per oculum eunte nigra: macula parva supraoculari et linea a basi mandibulæ orta et ultra regionem paroticam producta pure albis: remigibus nigricanti-brunneis, extus brunnescenti-olivaceo lavatis: gula saturate nigricanti-ardesiaca: pectore pallide ardesiaco, abdomine versus albicante: abdomine imo pure albo: corporis lateribus olivaceis: rostro nigro: pedibus corneo-brunneis.*

♀ ad. *A mari diversa: supra omnino olivacea, capite summo concolori: capitis lateribus sordide ardesiacis: regione parotica nigricante: genis cum gutture toto et pectore medio albicantibus: cæterum fere ut in mari colorata.*

Fig. 2.



Mystacornis crossleyi.

Adult male. Above olive-brown; forehead and sides of the head slaty-grey; feathers in front of the eye, encircling the latter and extending beyond the ear-coverts, deep black; a little line of feathers above and below the eye, as well as a line of feathers along the cheeks, white; quills blackish brown, margined exteriorly with olive-brown, especially the secondaries, which are almost entirely of the latter colour; tail olive-brown; entire throat dark slaty grey, almost black; breast paler grey, becoming whiter towards the lower parts; abdomen pure white; flanks and under wing-coverts olive-brown; under tail-coverts white; bill black; feet pale horny brown. Total length 6 inches; of bill from front 0·8, from gape 1; wing 2·7; tail 1·7; tarsus 0·9.

Adult female. Head and entire upper surface olive-brown, somewhat inclining to green; sides of the head commencing from the

base of the upper mandible pale grey; ear-coverts black; cheeks white; throat white, somewhat tinged with grey on the upper part of the breast; middle of the belly white; flanks olive-brown; under tail-coverts white, broadly edged with olive-brown. Total length 6 inches; of bill from front 0·8, from gape 1; wing 2·9; tail 2·7; tarsus 0·9.

"*a*, *b*. Male and female. Nossi Vola, Oct. 28th, and Nov. 12th, 1869. Native name *Surat ala*. Eyes black.

"*c*. Saralalan, Nov. 16th, 1869."

16. PRATINCOLA SIBYLLA.

Pratincola sybilla (Linn.); Hartl. Faun. Madag. p. 38; Roch & E. Newt. Ibis, 1862, p. 272.

Pratincola sibylla, E. Newt. Ibis, 1863, p. 345; Scl. P. Z. S. 1863, p. 163; A. Newt. P. Z. S. 1865, p. 836.

Pratincola pastor, Grand. Rev. et Mag. de Zool. 1867, p. 359.

Saxicola torquata, Schl. & Poll. Faun. Madag. Ois. p. 93.

"Vodirat, 25 miles N.W. of the capital. Native name *Fittat*. Male and female."

I must confess that it is with some little surprise that I have found the Stonechat of Madagascar united without a question to the Stonechat of Europe, Asia, and Africa; for Professor Schlegel unites under the heading of *Saxicola torquata*, the following birds, which most of us are accustomed to regard as distinct species:—*Pratincola rubicola* (Linn.), *P. sibylla* (Linn.), *P. indica*, Blyth, *P. hemprichi* (K. & B.), *P. pastor* (Voigt), *P. albofasciata* (Rüpp.), *P. borbonica* (Bory). It seems to me that, of these, there can be little question that *P. hemprichi*, of which I have seen several specimens, *P. albofasciata*, and *P. borbonica* are all certainly distinct: and I do not wish to go into the question in the present inquiry; but having a goodly series of all the others, I think that a few remarks on them may be of some service to ornithologists. Now, as regards the distinctness of *P. indica* from our *P. rubicola*, I would state that I do not wish to separate these two species, although in the breeding males of the latter the red of the breast is more deep and extends further on to the abdomen than in Indian birds. For the absolute settlement of this question it will be necessary to compare a series of males and females shot in Europe and in India at precisely the same period of the year; and especial attention would have to be directed to the birds shot in the Punjab and North-western Provinces, where the Desert Region, which carries with it so many of our European forms to be included in the "Birds of India," ends, and the true Indian fauna commences. I would call the attention of Mr. Hume and the various other ornithologists who are now doing good work in that country to the probable existence of a small race of *Pratincola indica* inhabiting the hills near Simla. A pair in my collection from that locality are decidedly smaller than ordinary *P. indica*.

Next, as regards *Pratincola torquata* (*Pr. pastor*, auct.), Professor Schlegel states that specimens from the Cape, Southern Siberia,

China, and Japan do not present the least differences. I regret that I cannot agree with him as to the identity of the South-African birds, which appear to contain constant characters whereby they may be at once distinguished. The male always has a conspicuous white rump, far more so than in *P. rubicola*; and this white rump is exhibited in the *female* of *P. torquata*, but is altogether wanting in the female of *P. rubicola*. I have a series of both species before me.

Lastly, as regards *P. sibylla*, which I have always looked upon as one of the most distinct of all the true Stonechats. The nearest ally of the Madagascar bird is, as might be expected, *P. torquata*; but it may be distinguished by the pure white belly and under tail-coverts, and the more sharply defined lower margin of the rufous breast, which seems to form a band of red, whereas in *P. torquata* it gradually shades off into the buff of the abdomen. Comparing the females of the two species together, that of the Madagascar bird is altogether greyer in tint above, and not so strongly tinged with buff on the abdomen.

17. COPSYCHUS PICA.

Copsychus pica, v. Pelz.; Hartl. Faun. Madag. p. 38 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 368; Schl. & Poll. Faun. Madag. p. 95 (1868).

"Nossi Vola, Nov. 10th, 1869. Native name *Fittat ala*."

"Vodirat, 25 miles N.W. of Antananarivo."

Fam. MOTACILLIDÆ.

18. MOTACILLA FLAVIVENTRIS.

Motacilla flaviventris, Verr.; Hartl. Faun. Madag. p. 39 (1861); Roch & E. Newt. Ibis, 1862, p. 273; Scl. P. Z. S. 1863, p. 163; E. Newt. Ibis, 1863, p. 346; Grand. Rev. et Mag. de Zool. 1867, p. 385.

In plumage this bird seems a connecting-link between the Pied Wagtails and our Grey Wagtail (*Motacilla sulphurea*), and possesses characters uniting the two sections of the genus *Motacilla*. In habits it appears strikingly similar to the last-named species.

Fam. PLOCEIDÆ.

19. PLOCEUS PENSILIS.

Nelicurvius pensilis (Gm.); Hartl. Faun. Madag. p. 54 (1861); E. Newt. Ibis, 1863, p. 349; Grand. Rev. et Mag. de Zool. 1867, p. 388.

Ploceus pensilis, Schl. & Poll. Faune Madag. Ois. p. 108 (1868).

"Nossi Vola, Nov. 11th, 1869. Native name *Foode ala*."

This Weaver-bird differs conspicuously in the sexes, the male having a beautiful black head, while the female has the head dusky olive, relieved by bright yellow cheeks, forehead, and eyebrow. I give a detailed description of the adult male and female, and also of a young male.

♂ *ad.* Head velvety black; nape rich orange; upper surface of the body olive-green, lighter on the rump and shading into brownish olive on the upper tail-coverts; quills brownish black, the inner web grey at the base, the outer web of the primaries narrowly edged with bright olive-green; the secondaries more broadly, the innermost ones being almost entirely olive-green; tail brownish black, each feather marked exteriorly with brownish olive; chin black; entire throat and sides of the neck rich golden yellow, becoming deeper on the lower part of the throat; below the throat a narrow band of feathers olive-green like the back; rest of the under surface of the body dark slaty grey; vent and under tail-coverts chestnut; under wing-coverts light grey, marked with olive-green.

♀ *ad.* Head olive-green, bright yellow on the forehead and over the eye; space between the bill and the eye and the ear-coverts deep brown, the latter distinctly washed anteriorly with golden yellow; throat and upper part of the breast, sides of the latter, extending backwards and forming a neutral collar, rich golden yellow; remainder of the plumage as in the male.

♂ *juv.* Head, nape, and entire upper surface olive-green; a line of feathers extending backwards from the bill over the eye bright golden yellow; space between the bill and the eye dull black; cheeks and ear-coverts pale yellow, strongly tinged with olive-green; throat and sides of the neck rich golden yellow, but no nuchal collar, a few yellow feathers appearing here and there indicating where the collar will ultimately come.

Fam. Sturnidæ.

20. Hartlaubia madagascariensis.

Hartlaubia madagascariensis (Linn.); Hartl. Faun. Madag. p. 52 (1861); Roch & E. Newt. Ibis, 1862, p. 275; Scl. P. Z. S. 1863, p. 163; E. Newt. Ibis, 1863, p. 349; A. Newt. P. Z. S. 1865, p. 836; Schl. & Poll. Faun. Madag. Ois. p. 105 (1868).

Hartlauba madagascariensis, Grand. Rev. et Mag. de Zool. 1867, p. 357.

Several specimens.

Fam. Paradisiidæ.

Subfam. Philepittinæ.

21. Philepitta castanea.

Philepitta sericea, Hartl. Faun. Madag. p. 42 (1861).

Philepitta geoffroyi, Hartl. Faun. Madag. p. 42 (1861).

Brissonia nigerrima, Hartl. Faun. Madag. p. 42 (1861).

Philepitta jala, Grand. Rev. et Mag. de Zool. 1867, p. 356; Schl. & Poll. Faun. Madag. Ois. p. 87 (1868).

Philepitta castanea (Müll.); Gray, Hand-l. of B. i. p. 297 (1869).

The genus *Philepitta* stands preeminently forward as one of those peculiar forms which Madagascar produces, and the affinities of which it is so very hard to determine; but its present position in the

ornithological system seems to me certainly open to question. Mr. George Robert Gray, in his recent 'Hand-list,' places it in the family *Pittidæ*; but with these birds it appears to me to have no direct affinity, as it wants the extraordinary development of foot so characteristic of these birds. Prince Bonaparte places it near the African genus *Dilophus* with apparently more discrimination; but in habits it essentially differs, for *Dilophus* is Starling-like in all its economy. I should prefer to keep *Philepitta* away from the *Turdidæ* altogether, and to class it near the Paradise-birds, of which family it may be considered an aberrant genus. Indeed it seems to form a separate subfamily, which may be called *Philepittinæ*.

If there is really no mistake in assigning Müller's name of *castanea* to the present bird, I can only give the learned Professor very little credit for discrimination—a point in which I feel sure that the most ardent admirer of the golden rule of priority, which so ruthlessly obliges us to allow the names of this "disturber" of ornithological nomenclature, would agree with me.

Four or five males of this beautiful bird were sent in the present collection, mostly in the fully black plumage figured by Professor Schlegel (*l. c.* fig. 1); one or two, however, had a few yellow edgings to the feathers, the last remains of the immature plumage. Judging from this fact, it would appear that the *Brissonia nigerrima* of Hartlaub, the original type of which is figured by Professor Schlegel (*l. c.* fig. 2), is the young male assuming the adult dress.

22. CAPRIMULGUS MADAGASCARIENSIS.

Caprimulgus madagascariensis, Sganz.; Hartl. Faun. Madag. p. 25 (1861); E. Newt. Ibis, 1863, p. 340; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 353; Schl. et Poll. Faun. Madag. p. 64 (1868).

Fam. MEROPIDÆ.

23. MEROPS SUPERCILIOSUS.

Merops superciliosus, Linn.; Hartl. Faun. Madag. p. 31 (1861); E. Newt. Ibis, 1863, p. 340; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 355; Schl. & Poll. Faun. Madag. Ois. p. 60.

Three specimens are in the present collection; and an examination of them entirely confirms the opinion expressed by Dr. Finsch (J. f. O. 1867, p. 237) and upheld by myself (P. Z. S. 1870, p. 145), that the Madagascar Bee-eater is identically the same as the continental species.

Fam. CORACIADÆ.

Subfam. CORACIANÆ.

24. EURYSTOMUS GLAUCURUS (Müller).

Eurystomus madagascariensis, Hartl. Faun. Madag. p. 27; Roch & E. Newton, Ibis, 1862, p. 270; E. Newt. Ibis, 1863, p. 341;

Grand. Rev. et Mag. de Zool. 1867, p. 354; Schl. & Poll. Faun. Madag. Ois. p. 103 (1868).

Subfam. LEPTOSOMINÆ.

25. LEPTOSOMA DISCOLOR.

Leptosomus afer (Gm.); Hartl. Faun. Madag. p. 63 (1861); S. Roch & E. Newt. Ibis, 1863, pp. 166, 167; E. Newt. Ibis, 1863, p. 453; Schl. & Poll. Faun. Madag. Ois. p. 54 (1868).

Leptosoma discolor, Slater, P. Z. S. 1863, p. 628; A. Newt. P. Z. S. 1865, p. 834; Grand. Rev. et Mag. de Zool. 1867, p. 354.

A female specimen.

26. BRACHYPTERACIAS LEPTOSOMUS.

Brachypteracias leptosomus (Less.); Hartl. Faun. Madag. p. 28 (1861); E. Newt. Ibis, 1863, p. 341; Grand. Rev. et Mag. de Zool. 1867, p. 354.

One specimen, secured for the national collection.

27. ATELORNIS PITTOIDES.

Atelornis pittoides (Lafr.); Hartl. Orn. Madag. p. 29 (1861); Roch & E. Newton, Ibis, 1862, p. 271; E. Newt. Ibis, 1863, p. 341.

Brachypteracias pittoides, Grand. Rev. et Mag. de Zool. 1867, p. 354.

"Nossi Vola and Saralalan. Native name *Vorum Seak*. Iris brown. Quite local."

Mr. Crossley has sent several specimens of this rare bird. I shall reserve my remarks on this species for a paper I am now preparing on the African *Coraciadæ*, which will very shortly be ready.

Fam. ALCEDINIDÆ.

28. CORYTHORNIS CRISTATA.

Corythornis cristata, Sharpe, P. Z. S. 1869, p. 568.

Corythornis vintsioides, Scl. P. Z. S. 1863, p. 162; Newton, P. Z. S. 1865, p. 834; Sharpe, Monogr. Alc. pt. 5 (1869).

Alcedo vintsioides, Grand. Rev. et Mag. de Zool. 1867, p. 354.

The full synonymy of this species is given in my 'Monograph;' but I have added one or two references which escaped my notice at the time.

29. ISPIDINA MADAGASCARIENSIS.

Ispidina madagascariensis (Linn.); Sharpe, Monogr. Alc. pt. 4 (1869).

Dacelo madagascariensis, Grand. Rev. et Mag. de Zool. 1867, p. 354.

"Nossi Vola, November 13th, 1869. Saralalan, November 19th, 1869. Native name *Bivsi ala*. Eyes dark brown."

Fam. CUCULIDÆ.

30. COUA CRISTATA.

Coua cristata (Linn.); Hartl. Faun. Madag. p. 62 (1867); Roch & E. Newt. Ibis, 1863, p. 166; Grand. Rev. et Mag. de Zool. 1867, p. 392; Schl. & Poll. Faun. Madag. Ois. p. 57.

Serisomus cristatus, E. Newt. P. Z. S. 1865, p. 834.

One specimen.

31. CUCULUS ROCHII.

Cuculus canorus, Desjard. P. Z. S. 1832, p. 111.

Cuculus rochii, Hartl. P. Z. S. 1862, p. 224 (descr. orig.); Roch & Newt. Ibis, 1863, p. 166; E. Newt. Ibis, 1863, p. 453; Schl. & Poll. Faun. Madag. Ois. p. 53.

Cuculus himalayanus, Grand. Rev. et Mag. de Zool. 1867, p. 418.

One specimen.

Fam. STRIGIDÆ.

32. SCOPS RUTILUS.

Scops rutilus, Pucher.; Hartl. Faun. Madag. p. 22 (1861).

Scops menadensis, Grand. Rev. et Mag. de Zool. 1867, p. 320; Schl. & Poll. Faun. Madag. Ois. p. 49 (1868).

One specimen, secured by the British Museum.

Fam. COLUMBIDÆ.

33. FUNINGUS MADAGASCARIENSIS.

Funingus madagascariensis (Linn.); Hartl. Faun. Madag. p. 64 (1861); Scl. P. Z. S. 1863, p. 164; Roch & E. Newt. Ibis, 1863, p. 167; Grand. Rev. et Mag. de Zool. 1867, p. 418.

Ptilopus madagascariensis, Schl. & Poll. Faun. Madag. p. 113 (1868).

One specimen.

Fam. PHASIANIDÆ.

34. NUMIDA TIARATA.

Numida tiarata (Bp.); Hartl. Faun. Madag. p. 68 (1861); Roch. & E. Newt. Ibis, 1863, p. 168; E. Newt. Ibis, 1863, p. 454; A. Newt. P. Z. S. 1865, p. 836; Grand. Rev. et Mag. de Zool. 1867, p. 418; Sch. & Poll. Faun. Madag. Ois. p. 118 (1868).

One specimen, which has been secured by the British Museum.

Fam. SCOLOPACIDÆ.

35. GALLINAGO BERNIERI.

Gallinago bernieri, Pucher.; Hartl. Faun. Madag. p. 78 (1861); Roch & E. Newt. Ibis, 1863, p. 172; A. Newt. P. Z. S. 1865, p. 837; Grand. Rev. et Mag. de Zool. 1868, p. 4.

One specimen.

36. RHYNCHÆA CAPENSIS.

Rhynchæa capensis (Linn.); Hartl. Faun. Madag. p. 78 (1861);

Young



Adult



NANNOPHRYNE VARIEGATA.



G.H. Ford

HYLA (LITORIA) AUREA, VAR.

W.West imp.

Young



Adult



NANNOPHRYNE VARIEGATA.



G.H. Ford

HYLA (LITORIA) AUREA, VAR.

W West imp.

Fam. ANATIDÆ.

40. SARCIDIORNIS AFRICANA.

Sarkidiornis africana (Eyton); Hartl. Faun. Madag. p. 81 (1861); Grand. Rev. et Mag. de Zool. 1867, p. 5.

Anas melanotus, Schl. & Poll. Faun. Madag. Ois. p. 142 (1868).

One fine male specimen.

2. Second account of Species of Tailless Batrachians added to the Collection of the British Museum. By Dr. A. GÜNTHER, F.R.S., F.Z.S.

(Plate XXX.)

In the 'Proceedings' of this Society, 1868, p. 478, I commenced to enumerate the species of Tailless Batrachians added to the collection of the British Museum since the publication of the 'Catalogue of Batrachia Salientia.' I am now able to add only six to the number then given. The total number of species amounts now to 319*, and that of typical specimens to 127.

The species added to the collection are the following :—

CLINOTARSUS ROBUSTUS (Mivart). ——? St. G. Mivart, Esq.

CERATOPHRYS MEGASTOMA (Spix)†. Surinam. Hr. Kappler.

CYSTIGNATHUS TÆNIATUS (Girard). Chiloë. Dr. Cunningham.

NANNOPHRYNE VARIEGATA (g. et sp. n.). Coasts of Magellan Straits. Dr. Cunningham.

BUFO HÆMATITICUS (Cope). Costa Rica. Mr. Higgins.

HYLA CORIACEA (Peters). Surinam. Hr. Kappler.

TOMOPTERNA NATALENSIS (Smith).

We have lately received this species from Madagascar. On comparing the example with Prof. Cope's description of *T. labrosa* (1868) from the same island; I am inclined to think that they are identical, or, in other words, that *T. labrosa*=*T. natalensis*.

NANNOPHRYNE (g. n. BRACHYCEPHALIN.).

In habit similar to a young Toad. Teeth none. Tongue elliptic, entire behind. No tympanum or cavum tympani. Apophysis of the sacral vertebra dilated. A pair of parotoids on each side, besides

* According to a statement of Prof. Peters (Monatsb. Ak. Wiss. Berlin, 1869, April), the Berlin Museum is richer than the British Museum with regard to the number of species, as it contained 325 species in the year 1869.

† This species has a slight transverse crest between the eyes.

other smaller similar glands scattered on the body and legs. Hind toes slightly webbed. A blunt tubercle at the base of the first toe.

NANNOPHRYNE VARIEGATA. (Plate XXX. figs. 1 & 2.)

Head of moderate width. Snout short, about as long as the diameter of the eye; no canthus rostralis, loreal region sloping. Choanæ very small. An ovate, well-defined parotoid gland behind the eye; another smaller at some distance behind it. There are other similar but very small glands on the crown of the head, on the sides of the neck, on the back, and one on the calf of the leg. In young examples all these glands are very indistinct. The length of the body equals the distance between the vent and the end of the first toe. Subarticular tubercles but slightly developed; metatarsus with two tubercles; no fold along the tarsus. Toes flattened, third and fifth equal in length; web very narrow.

The young is black, prettily ornamented with about five well-defined green, nearly white, bands, which run along the back, but are rather irregular on the head. Also the legs are black, with irregular green stripes and spots. Lower parts greenish, mottled with black, both colours being distributed in about equal proportions. In old examples the ornamental colours are indistinct; and they may be uniformly brown, with scarcely a trace of the pretty coloration of the younger state.

Specimens of this Frog were taken by Dr. Cunningham, the Naturalist of the Magellan Straits' Expedition at Puerto Bueno, Port Grappler, and in Eden Harbour. The largest is 35 millims. long, the hind limb being 47, and the fourth toe 13 millims. long.

LITORIA AUREA. (Plate XXX. fig. 3.)

Hyla aurea, auct.

A number of examples received from tropical parts of Australia, of the north as well as west, belong to a very marked variety of this widely distributed species. The bluish spots on the back are smaller and more numerous than in the type, and more distinctly marked, with a darker edge; and the lower sides are densely reticulated with black. Groin and inside of the thighs black, with white spots. The black reticulations are the more developed the larger the individual; and very young specimens have the lower parts white, entirely immaculate.

The figure represents an old example of this Frog.

3. Description of new Species of Pheasants from the Province of Yarkand, Eastern Turkestan, and from the Island of Formosa. By D. G. ELLIOT, F.L.S., F.Z.S., &c.

Through the kindness of Capt. C. H. T. Marshall, Bengal Staff Corps, I have been enabled to examine a small collection of mam-

mals and birds, brought by Mr. Robert Shaw from the distant province of Yarkand, Eastern Turkestan. Mr. Shaw, although perhaps not the first European who has penetrated this country, is certainly, I believe, the only Englishman who has succeeded in getting away from it with his head on his shoulders. There were but few species brought by him: among the mammals there are some probably new to science; I hope to give a list of them shortly. Of birds there were only five specimens, four Pheasants and one *Tetraogallus himalayensis*. The Pheasants represent two new species, which I propose to call *P. shawii* and *P. insignis*. They belong to the true *Phasianus*, and may be described as follows.

PHASIANUS SHAWII, sp. nov.

Pileo summo nitide viridi; collo postico et gutture toto, genis et colli lateribus purpurascente et viridi variantibus; dorso summo aureo-metallico, plumis macula apicali saturate indigotica notatis; dorso imo saturate castaneo, albo et nigro parum variegato et maculis paucis indigoticis notato, sub certa luce viridi nitente; tectricibus supracaudalibus saturate castaneis unicoloribus, scapularibus aureo-castaneis, dorso proximis albo et nigro conspicue fasciatis: tectricibus alarum fere albis, majoribus late castaneo marginatis: remigibus pallide brunneis, secundariis albo marginatis; interioribus rufo marginatis, primariis intus albo fasciatis, extus albo lavatis et variegatis: cauda rufo-brunnea irregulariter nigro fasciata, subtus albo et nigro variegata: pectore superiore metallice aureo-castaneo, plumis omnibus indigotica marginatis: pectore reliquo aureo-castaneo saturatiore; hypochondriis aureis nitente purpureo terminatis: abdomine sordide brunneo, nigricante: rostro flavido.

Top of head and occiput brown, changeable to purple and green in different lights; rest of head, throat, and neck green, changing to blue and purple. No white ring round the neck. Feathers of upper part of back black at base running about two-thirds the length; shaft and adjacent part of middle of the feather white; between the black and the metallic golden brown edging is dull chestnut; each feather tipped with metallic blue. Scapulars, for the most part, chestnut, with small spots of metallic blue at the tip; bases of the feathers grey, shaft and centre white; between this white and the brown edging a bar of black. Shoulder white, a few feathers variegated with black, principally in the centre of the feathers. Some of the greater coverts long and broadly margined with chestnut. Secondaries pale brown, outer web slightly washed with rufous on the edge, mottled in the centre with fulvous and black. Rump chestnut-red, covered in some lights with greenish reflections; the ends of the feathers, which are very long, hiding the upper coverts, deep unchangeable red. Feathers of the upper part of the breast broad (with a rich blue spot in the centre at tip), deep rich chestnut, margined with brilliant blue. Feathers of lower part of the breast broader, and rather lighter in colour, bordered also with blue. Flanks golden brown, with a brilliant dark blue spot in the centre at

the tip. Abdomen brownish black. Under tail-coverts red. Central tail-feathers rufous brown, with short narrow black bars next the shaft, but not on the same line on both webs, and continued across the web by a bar of chestnut joining the black. Outer webs of lateral feathers similar; inner webs light brown, mottled with black, and barred at regular intervals with the same colour. Bill yellowish horn-colour. Feet and tarsi greyish.

Total length from base of bill to tail 16 inches; wings 9 inches; tail about 15 inches, bill, culmen 1¼ in., at gape 1½ in.; tarsus 2½ in.; middle toe 2 in.

Hab. Yarkand, Eastern Turkestan.

This interesting species appears to be very common in Yarkand, as Mr. Shaw states that he shot many of them, and, indeed, mistook it for the common *Phasianus colchicus*. To one who had not been accustomed to examine Pheasants at all critically this conclusion would be a very natural one, although the *P. shawii* differs in almost every respect from the better-known species. It is one of the most interesting discoveries yet made among the gallinaceous birds, affording links in the chain of descent, connecting the various species of true *Phasianus* together, which were heretofore entirely wanting. There is strong reason to believe that this new form of *P. shawii* is the original stock (looking at the subject in a Darwinian point of view) from which all the known species of *Phasianus* have sprung. By the newly discovered forms of *P. sladeni*, Andersson MS., from the province of Yun-nan, it would appear to exhibit the direction towards *P. versicolor*, and through Mr. Swinhoe's *P. decollatus* to the true *P. torquatus*, as known to ornithologists. On the other hand, by the next species, *P. insignis*, it bears off to *P. mongolicus*; and it would require only a few degrees of change for it to be merged in *P. colchicus*. Of course this is theoretical at present, as some necessary localities, from which we can naturally expect to receive other new forms supplying the remaining links still required are yet unexplored; but if we are to suppose that all true Pheasants have but one origin or source, all the information which has thus far been gathered upon the subject apparently leads us to the belief that the form now designated as *P. shawii* will have to be accepted as the one from which all the rest have sprung.

The species is a very handsome one, and peculiar from the almost uniform golden-yellow hue of the upper parts, and would be a most desirable acquisition, together with the other species already obtained, to parks and preserves.

Both the examples of this species, brought by Mr. Shaw, are males and precisely similar. The female is unknown.

PHASIANUS INSIGNIS, sp. nov.

Mas. *Colli plumis ad basin nigris, parte mediana saturate castanea, apicibus latis nitenti-viridibus; dorso toto et scapularibus lætissime aureo-castaneis, fascia nigra una utrinque notatis, macula nitente viridi triangulari conspicue punctatis, rhachidibus albis: dorso imo uropygioque saturate castaneis:*

tectricibus alarum albis, intimis castaneo marginatis, exterioribus nigro et brunneo variegatis; remigibus pallide brunneis, fulvescenti-albo fasciatis: cauda rufo-brunnea nigro anguste et regulariter fasciata; rectricibus exterioribus, præcipue pogonio interno, nigro variegatis: pectore medio splendide aureo-castaneo, nitente viridi late terminatis: hypochondriis splendide aureis, apicibus conspicue nitenti-viridibus: abdomine imo tibiisque nigris: subcaudalibus castaneis paullo viridi nitentibus.

Fœm. *Fulvo-brunnea, pallide rosaceo passim induta: dorsi plumis cinerascenti-brunneo marginatis, ante apicem fascia fulva, parte mediana rufo et nigro fasciata: remigibus pallide brunneis nigro transfasciatis: cauda rosaceo-brunnea, nigro transfasciata: subtus rosaceo-fulva; hypochondriis fasciis latis nigris conspicue notatis.*

Male. Feathers of the neck black at base, deep chestnut in the centre, and broadly tipped with brilliant green: back and scapulars golden chestnut, with a triangular black bar starting from the shaft about a third of its length from the tip; shaft white; a triangular spot at the tip brilliant green; back and rump deep rich chestnut-red; wing-coverts white, margined at the lower half with fulvous. Tail reddish brown, barred equally and at regular intervals with black for about half the width of the web, outer half barred with chestnut; lateral feathers reddish brown on the outer webs, greyish brown on the inner, barred regularly with black. Underside of tail-feathers chestnut, barred broadly and distinctly with black. Upper part of breast brilliant golden chestnut, broadly tipped with shining green; flanks bright golden, with the ends of the feathers covered with a large triangular spot of brilliant shining green; centre of abdomen and thighs black; under tail-coverts chestnut, tips washed with shining green; feet and tarsus blackish brown.

Length from end of neck to rump 10 inches; wing 11 inches; tail 20 inches.

Female. General colour buff, tinged with a rosy hue; feathers of the back edged with ashy brown, before a band of yellowish, which is repeated two or three times, interrupting the black which runs along the shaft. Primaries pale brown barred with brownish black; tail rosy brown, barred irregularly with black; breast dark buff; flanks rosy buff, conspicuously spotted with black.

Hab. Yarkand.

This fine bird, which may be considered a second species of the group containing *P. mongolicus*, is even more brilliant in plumage than its ally, and will doubtless be considered hereafter the most beautiful of all the members of the restricted genus *Phasianus*. The feathers of the breast and flanks shine with the most brilliant metallic colours, and the living bird must be a splendid object. Unfortunately the two skins brought by Mr. Shaw are without the heads, and I am unable to give a description of that important part of the body; but as that portion varies but slightly in the true Pheasants, it would not be at all hazardous to suppose that the *P.*

insignis would resemble very closely in its head and neck the *P. mongolicus*, with the important exception that it will probably be without the white ring so conspicuous in its ally—as the feathers of the neck, which remain in the specimen in my possession show the commencement of the metallic blue and green hues so prevalent in the true Pheasants, but no indication whatever of any white. Although an ally of *P. mongolicus*, and equally large in size, it differs from that species in nearly every particular of markings and colour, being very much more brilliant in the hues of its plumage, and the metallic spots larger and more conspicuous. The under surface of the tail-feathers is very dark chestnut, and conspicuously barred with black, this part of its ally being rather faintly marked.

The female resembles the hen of *P. mongolicus* in its general appearance, but is readily distinguishable by a rosy hue, which is prevalent over the entire plumage.

This beautiful species was obtained by Mr. Shaw at Yarkand; but I am unable to state to what portion of the province it is restricted; for we cannot suppose it inhabits precisely the same locality as the previously described species.

PHASIANUS FORMOSANUS, sp. nov.

Mas. Ph. *pileo ochraceo-cinerascente viridi-nitente; fronte nigra; macula parva infraoculari et altera ad basin mandibulæ cum regione auriculari purpureo-nigris; facie nuda scarlatina; torque nuchali metallice viridi; striga superciliari et cinctu collari albis, hoc supra viridi terminato: dorso superiore læte stramineo, plumis omnibus macula triangulari nitenti-viridi notatis: scapularibus castaneis, parte basali fusca nigro variegata, parte mediana alba nigro lineata: tectricibus alarum pulchre cinereis: remigibus brunneis, externe cinerascente lavatis et albo irregulariter notatis: secundariis castaneo lavatis: dorso postico cinereo, nigro et ochraceo vermiculato; tectricibus supracaudalibus cinereis ochraceo tinctis: cauda parte mediana ochrascenti-cinerea, rufo externe marginata, late nigro supra partem cineream, rufo supra partem castaneam fasciata: gutture toto et colli lateribus nigris viridi micantibus: pectore castaneo, lilacino nitente, plumis anguste indigotico marginatis-pectoris lateribus pallide stramineis saturate indigotico terminatis; pectore medio nigro, viridi nitente; abdomine nigro.*

Fœm. *Supra nigricans; collo postico castaneo, plumis albo et nigro versus apicem fasciatis; subtus fulvescens.*

Male. Forehead dark green; stripe over each eye, commencing at the end of the green spot on the forehead and reaching to the occiput, white; top of head and nape light green; throat and neck metallic green, blue in some lights; a narrow white collar, interrupted in front, passing round lower part of the neck; upper part of back yellowish buff, basal half of the feathers black, except along the shaft, where it is buff, and the outer edges and a large triangular spot at the tip, brilliant green; scapulars broad, with their centres yellowish white, mottled with black at the basal end, but perfectly free from mottling

elsewhere, this separated from the broad chestnut margin by a line of black; secondaries dark brown, mottled with buff and black, and very broadly margined with dark chestnut on the upper ones, the edges of rest yellowish brown; primaries dark brown, irregularly barred with yellowish white on both webs; back and rump light green mottled with buff and dark green. Upper part of breast deep rich red, purple in certain lights, margined with dark blue, and a triangular spot of the same in the centre at the tip; flanks white, the ends of the feathers dark metallic blue; abdomen dark green separated from the white of the flanks by a line of deep chestnut composed of the inner webs of the lowest flank-feathers. Thighs black; under tail-coverts red. Central tail-feathers pale green in the centre, chestnut on the edges, the green barred with broad black bands close together, these changing to chestnut on the edges; lateral feathers similar, but mottled with buff and black on the inner webs, and terminal portion of the outer web without bars; bill pale greenish yellow; tarsi and feet brownish; irides white.

Length 14 inches; wings 9⅓ in.; tail 12¼ in.; tarsi 2⅓ in.; middle toe 1¾ in.

Female. Head pale buff, much blotched with black on the crown, and rosy on the cheeks; upper part of back dark chestnut, with a terminal irregular bar of black and tipped with white; rest of upper parts black, the feathers margined with reddish buff, and the shafts buff; tail buff, closely barred with black, and mottled on the edges with the same; wings lighter than the back, the buff being more prominent, but similarly marked; primaries dark brown, and barred with yellowish buff as in the male; upper part of breast dark buff with a reddish tinge, some of the feathers with black longitudinal lines; rest of underparts dark buff faintly mottled with brown.

Length 13 in.; wing 8 in.; tail 8 in.; tarsus 2 in.; bill 1¼ in.

This is the common Pheasant of the Island of Formosa, and, although resembling the well known *P. torquatus* of China, differs from it, in both the sexes, by many and striking characteristics. The male differs from that of *P. torquatus* by the narrow ring on the neck, the conspicuously broad white superciliary stripe, the light-coloured mantle, the scapulars with their largely developed white centres free from mottling, the green rump (blue in its ally), the white flank-feathers, the broadly barred short tail, and by the white eye, which, as I am informed by Mr. Swinhoe, is a constant character. Some of the above-mentioned distinctions might be regarded by some as evidences of albinism; and if there were but a single specimen marked, the supposition might be an important one; but all those brought by Mr. Swinhoe agree together in their markings, and he tells me that all of this form upon the island also agree with these types. The female possesses equally peculiar markings to distinguish her from the hen of *P. torquatus*, being much darker—in fact, almost black upon the upper parts.

This species, although undoubtedly of the same origin as the *P. torquatus*, has, from the physical causes operating upon it peculiar to its island home, undergone in the course of time the changes

which now present themselves to us, and which make it readily recognizable wherever seen. Although to some it may be deemed hardly entitled to a specific rank, yet it is certainly worthy of some appellation to enable it to be distinguished when mentioned; and as binominal names are the only ones admissible, it becomes necessary to give it specific rank, rather than to describe it as a variety. The true *torquatus* of China is not known in Formosa. In my Monograph of the Phasianidæ, now publishing, I shall give a Plate showing both sexes of this species, drawn by Mr. Wolf, which will exhibit its characteristics more clearly than my description has.

The discovery of these new species increases the number of true Pheasants now known to ornithologists to nine, a list of which is here given.

1. PHASIANUS COLCHICUS.

Phasianus colchicus, Linn. et auct.
Hab. Mingrelia, the Ancient Colchis; River Ilia, Caucasus; Lake of Apollonia near Broussa, Albania; Gulf of Salonica, Ætolia.

2. PHASIANUS SHAWII.

Phasianus shawii, Elliot, P. Z. S. 1870.
Hab. Province of Yarkand, Eastern Turkestan.

3. PHASIANUS INSIGNIS.

Phasianus insignis, Elliot, P. Z. S. 1870.
Hab. Province of Yarkand, Eastern Turkestan.

4. PHASIANUS MONGOLICUS.

Phasianus mongolicus, Brandt, Bull. Acad. Scien. St. Pétersb. vol. iii. p. 54.
Hab. Altai and Tarbagatai Mountains; Gobi Desert, south of the Tangnu Mountains, Mongolia; Boukhara.

5. PHASIANUS TORQUATUS.

Phasianus torquatus, Gmel. Syst. Nat. (1788), t. i. p. 742.
Hab. Eastern China, from Transbaikalia, Amoorland, into Southern China; Provinces of Hankow, Tientsin, Foochow, and Pekin.

6. PHASIANUS FORMOSANUS.

Phasianus formosanus, Elliot, P. Z. S. 1870.
Hab. Island of Formosa.

7. PHASIANUS DECOLLATUS.

Phasianus decollatus, Swinhoe, P. Z. S. 1870, p. 135.
Hab. Eastern part of the province of Szechuen.

8. PHASIANUS SLADENI.

Phasianus sladeni, Anderss. MS.
Hab. Western borders of the province of Yunan.





G.H.Ford

Trimeresurus



W. West. imp.

macrosquamatus



9. PHASIANUS VERSICOLOR.

Phasianus versicolor, Temm. Plan. Col. 486 & 493.
Hab. Japan.

4. Note sur le jeune de l'année du *Pelecanus sharpei**.

Par. J. V. BARBOZA DU BOCAGE, F.M.Z.S. &c.

Teinte générale d'un brun-roussâtre foncé ou couleur chocolat, noirâtre sur la tête, d'un ton plus clair (roussâtre) sur le bas du dos, le roupion, le bas-ventre et les couvertures supérieures et inférieures de la queue; couvertures supérieures et inférieures des ailes d'un brun-noirâtre avec une large bordure roussâtre; remiges primaires presque noires; remiges secondaires et tertiaires ainsi que les plumes de la queue, d'un brun clair au milieu et d'un gris blanchâtre vers les bords; bec d'un jaune sale vers la base, d'un brun plus ou moins foncé dans le reste de son étendue; poche gutturale ainsi que les tarses d'un brun clair.

Dimensions. Longueur totale $1^{m}\cdot46$, aile 0·68, bec 0·35, tarse 0·145.

Habitat. L'Afrique occidentale, Angola.

Obs. Degland décrit les jeunes de l'année du *P. onocrotalus* d'un cendre blanchâtre à la tete, au cou et en dessus du corps; d'un *cendré foncé* au dos, aux scapulaires et aux *couvertures alaires, avec les bordures d'une teinte plus claire*; remiges noirâtres; bec et partie nue de la gorge et des joues livides; pied brun-cendré; iris brun.

Mr. Elliot (P. Z. S. 1869, p. 579) dit ce qui suit:—

"The young during the first year are uniform greyish brown, the lanceolate feathers of the breast being entirely wanting."

5. Note on Reptiles and Batrachians collected in various parts of China.

By R. SWINHOE.

(Plate XXXI.)

1. PLATYSTERNUM MEGACEPHALUM, Gray; Günth. Reptiles of Brit. Ind. p. 43.

I procured a single specimen of this curious tortoise in a bird-shop at Canton. It is brought down the West River from the western parts of Kwangtung Province and from Kwangse. As recorded, the head, limbs, and tail are not capable of retraction within the shell; the tail is protected by curling under the right margin of the carapace. I kept my specimen alive through the winter without food.

2. DERMATOCHELYS CORIACEA (L.).

In the warm waters round Formosa the Green and the Tortoise-shell Turtles frequently occur; but these seldom show themselves in

* See the description of this species *antea*, p. 173.

the colder seas of the China coast. During the years I spent at Amoy I never heard of a Turtle being captured but once; this was in October 1859. It was a large old specimen of this species, of a yellowish madder-colour. I wanted to buy it to preserve; but nothing would induce the fishermen to sell it for this purpose. They said a Turtle never appears on the China coast except when some great calamity is imminent, and to avert this good men must deliver it from its captors and set it free. A Chinese firm in the town volunteered to do the good act. They purchased the Turtle, had Chinese characters cut on its back, signifying "set free for ever," which were filled in with vermilion, and, decking it with ribbons, took it in a boat in great state, with drums beating, to the outer limits of the harbour, where it was dropped into the sea. They said that if caught again the inscription on its back would protect it from meeting with further rough treatment.

The Turtle is with the Chinese an emblem of longevity.

3. Crocodilus, sp.?

In February 1869 some Chinese were exhibiting in the native city of Shanghai what they called a Dragon, which they declared had been dug out of a hole in the province of Shense. It was a young Crocodile about 4 feet long, which they kept in tepid water. They made so much money by showing it that they refused to sell it. I cannot, of course, guess its species; but I nevertheless think the fact worth recording, as evidence that a species of this group does occur in China.

4. Tachydromus septentrionalis, Günth. *l. c.* p. 70.

One specimen caught on the top of the city wall of Nanking. The Museum has specimens from Ningpo. It is a ground-Lizard, hiding under stones.

5. Eremias argus (Peters).

Very common in the cultivated fields about Peking. The Museum has specimens procured by me in 1860; but mention of these was omitted when the Society was made acquainted with the specimens collected by me during the North-China campaign (see P. Z. S. 1861, p. 391).

6. Mabouia chinensis (Gray), Günth. *l. c.* p. 83.

Specimens from the Pescadores. Very common about the millet-fields of the largest Pescadore Island. A small race, and much spotted with black.

7. Eumeces modestus, Günth. *l. c.* p. 87.

Found on the rocky bank of the Yangtsze river in a gorge in eastern Szechuen, 1300 miles from the sea. Before known only from Ningpo.

8. GECKO JAPONICUS (Dum. & Bibr.), Günth. *l. c.* p. 103.

From Chungkingfoo on the Yangtsze, in eastern Szechuen, 1459 miles from the sea. Found inside houses in the city, clinging to the walls, also on the trees in gardens. Delights in uttering its "chuck-chuck" note, especially in rainy weather. It is abundant in Taiwan-foo, Formosa.

9. IAPALURA SWINHOII, Günth. *l. c.* p. 133.

This comb-backed Tree-lizard was before only known from the woods of South Formosa. On my late expedition up the Yangtsze I found it on the rocks among woods near Chungkingfoo. It must therefore have a wide range across China.

10. ELAPHIS TÆNIURUS, Cope; Günth. *l. c.* p. 242.

Captured at Shanghai. Has been procured before at Ningpo, in the Chikiang Province.

11. TROPIDONOTUS QUINCUNCIATUS, Russell; Günth. *l. c.* p. 260.

Dr. Günther says that this is the most widely distributed species of the Indian Water-snakes, extending from Mesopotamia to the south of China. My specimens are from Amoy.

12. TROPIDONOTUS STOLATUS (Linn.), Günth. *l. c.* p. 266.

From Amoy. This is by far the commonest Water-snake in Amoy and in Tamsuy (Formosa). In the latter place the country lads brought it to me by scores at a time.

13. HYPSIRHINA PLUMBEA (Boie), Günth. *l. c.* p. 280.

From Amoy, where it is by no means common.

14. HYPSIRHINA ENHYDRIS, Russell; Günth. *l. c.* p. 281.

Also procured at Amoy.

15. HYPSIRHINA CHINENSIS, Gray; Günth. *l. c.* p. 283.

Captured at Ichang, 1111 miles up the Yangtsze river. The British Museum has specimens from China; but it is not known from what part of China.

16. HYDROPHIS CYANOCINCTA, Russell; Günth. *l. c.* p. 367.

This common Sea-snake is often floated into the small harbour of Takow, S.W. Formosa. My specimens are from there.

17. TRIMERESURUS MUCROSQUAMATUS (Cantor): Günth. *l. c.* p. 390. (Plate XXXI.)

From Formosa. Dr. Günther has made this out to be the species described by Cantor as *Trigonocephalus mucrosquamatus* (P. Z. S. 1839, p. 32), from Assam, from comparison of it with Cantor's drawing, the original specimen having been lost and no other since procured. Its occurrence in Formosa is somewhat singular. The two fine large specimens I have brought home were the only indi-

viduals I came across. One was brought to me from the interior; the other was captured at Takow, in the hall of a neighbouring Mandarin's office, having descended from the roof, in which it was lodged, by a rope on to a hanging lamp in pursuit of geckos (*Gecko japonicus*). It was tinted all over with blood-colour.

The specific characters of this snake, as kindly furnished to me by Dr. Günther, are:—

Scales in 25 rows, with a very strong keel to the tip, where it sometimes slightly projects. Ventral plates 217–220. Upperside of the head with very small granular scales; a series of larger ones along the canthus rostralis. Eleven upper labials, the second forming the anterior wall of the pit. Body brown, with a dorsal series of subrhombic, sometimes confluent spots; another series of similar more rounded spots along the lower part of the side. Each spot is of a dark brown colour, with a black margin, and generally a narrow white edge. Abdomen marked with brownish, each ventral shield having an ovate whitish spot on each side.

18. TRIMERESURUS ERYTHRURUS (Cantor), Günth. *l. c.* p. 386.

From Takow, Formosa. This is the first occurrence of this little green viper in Formosa. I have seen it frequently at Amoy; it is a bush-loving species, climbing to the top of plants, and coiling itself round the stems and leaves. Being of a fresh-green colour, it is not easy to detect; and while catching insects I have very narrowly escaped brushing my hand over the poisonous creature. The Chinese declare its bite to be fatal.

19. HALYS BLOMHOFFII (Boie), Günth. *l. c.* p. 393.

A specimen of this spotted brown Viper was brought on board the gunboat by some of the crew who had been on shore at Ichang, on the Yangtsze. It is known from Japan and Formosa; but this is the first instance of its occurrence in China proper.

20. RANA GRACILIS, Wiegm.; Günth. *l. c.* p. 409.

From Ichang. A common Frog in the rice-fields.

21. RANA SILVATICA, Leconte; Günth. *l. c.* p. 409.

From Ichang. Found in woods, among the dead leaves and decaying herbage.

22. DIPLOPELMA PULCHRUM (Hallon); Günth. *l.* c. p. 417.

From Ichang. I have met this wee Frog in various parts of China and Formosa. During the rains of spring and midsummer it occurs in thousands about grassy places. It does not resort much to wet rice-fields.

23. HYLORANA MACRODACTYLA, Günth. *l. c.* p. 424.

From Ichang. Does not climb trees, but keeps much to the damp ground about woods.

6. Notes on the Myology of *Platydactylus japonicus*.

By ALFRED SANDERS, M.R.C.S., F.Z.S.

If one may judge from treatises on Comparative Anatomy recently published, the muscles of the Lacertilia do not appear to have received a great deal of attention. This consideration has emboldened me to lay the following notes on the myology of *Platydactylus japonicus* before the Zoological Society,—the more so as this species differs considerably in the arrangement of its muscular system from the *Iguana tuberculata*, the myology of which was described in a paper by Mr. St. George Mivart, published in the Society's Proceedings in 1867.

Hyo-mandibular.—On the ventral aspect of the throat are seen two superficial skin-muscles, the most anterior of which arises by means of a tendinous raphe covering the glosso-hyal, being thus united to its fellow of the opposite side; and passing directly outwards through the fibres of the mylo-hyoid, it is inserted into the supplementary or coronoid and opercular pieces of the mandible immediately beneath the posterior teeth.

The next muscle slightly overlaps the last anteriorly, and arises from the basihyal at the point where the anterior horns are given off, and from a thin aponeurosis over the hyomandibular, and also from one covering the trachea behind the same point. As far back as opposite the posterior end of the mandible it is divisible into three distinct portions; the posterior passes outwards and upwards, and spreads out into a thin layer, which is inserted into the superficial fascia at the back of the head, intimately connected with the trapezius. The anterior portion forms a thin layer, covering the external pterygoid, and is inserted into the supraangular piece of the mandible; its posterior fibres are collected into a thicker mass, which passes upwards and rather backwards behind the mandible, and is inserted into the aponeurosis of the side of the neck and the complexus. The middle portion passes upwards within the mandible, and is inserted into the extremity of the terminal segment of the anterior cornu (cerato-hyal) of the os hyoides, close to the attachment of the latter to the exoccipital. This latter part perhaps represents stylo-hyoid.

Mylo-hyoid arises from the body of os hyoides (basihyal) and from the posterior cornu (thyro-hyal) as far outwards as the external pterygoid, leaving a space through which that muscle passes. The fibres run forward, and are inserted into the whole length of the dentary piece of the mandible, with the exception of a small portion anteriorly close to the symphysis; it is also attached to the fascia covering the anterior point of the glosso-hyal; it is situated deeper than or above the preceding muscular layers.

Genio-hyo-glossus arises from the posterior cornu of the os hyoides just beyond its articulation with the basihyal; and passing forward, its superficial fibres are inserted into the symphysis of the mandible, while the deeper ones go to the side and back of the tongue; the

superficial fibres also join those of the opposite side in a raphe covering the glosso-hyal.

Submentalis arises from the inferior surface of the dentary piece immediately outside and a short distance behind the symphysis, and is inserted into mucous membrane lining the floor of the anterior part of the mouth, and into the side of the tongue outside the genio-hyoglossus.

Thyro-hyoid arises from the basihyal, and is inserted into the outer circumference of the thyroid cartilage.

Cerato-hyoid arises from near the distal extremity of the thyro-hyal, and, passing downwards internal to the mandible, it is inserted into the segment of the cerato-hyal.

Omo-hyoid arises from the anterior border of the clavicle for about half its length, extending upwards to the claviculo-scapular articulation, and, passing forwards and downwards, it is inserted, broad and thin, into the posterior edge of the basihyal and thyro-hyal.

Sterno-hyoid arises from the interclavicle thick and fleshy, and, passing forwards, spreads out into a thin plane of muscular fibres, which is inserted entirely into the thyro-hyal dorsad of the last.

Sterno-cleido-mastoid arises from the posterior edge of the transverse apophysis of the interclavicle, and is connected with the anterior edge of the sternum by means of a tough membrane; passing upwards and forwards across the clavicle, it receives a small muscular slip from that bone, and is inserted into the extremity of the exoccipital behind its articulation with the os quadratum.

Temporal is a very thick and powerful muscular mass, arising, behind, from the anterior surface of the os quadratum, above from the squamosal and parietal, and in front from the frontal; the anterior fibres run directly downwards, the posterior downwards and forwards; and all are inserted into the articular, supraangular, and coronoid pieces of the mandible.

Neuro-mandibular.—This muscle appears to correspond with one of that name in serpents. It arises broad from the aponeurosis of the back of the head and edge of the complexus, and is inserted narrow into the posterior extremity of the articular piece of the mandible.

External pterygoid arises fleshy from the lower surface of the posterior part of the pterygoid bone, and tendinous from the posterior border of the anterior part of the same bone; it forms a rounded muscular mass enclosing the posterior part of the mandible, and is inserted into the external surface of the supraangular, and upper surface of the posterior part of the articular piece; this last part also arises from the lower end of the posterior side of the os quadratum.

Internal pterygoid.—A triangular muscle with its apex directed upwards arises from the anterior point of the prootic, and from the columella, and is inserted into the inner border of the articular piece of the mandible behind the coronary process; this muscle has no connexion with the pterygoid bone. Within this are two remarkable muscles; the more external arises from a point at the lower surface of the parietal, just above the articulation of the prootic with the

columella, covered in by the membrane which connects the upper edge of that bone with the parietal, at the point of attachment of the membrane corresponding to the alisphenoid, and is inserted into the upper border of the pterygoid, behind the columella. The other muscle is internal, and arises from the membranous alisphenoid, beneath the last, in front of the exit of the third division of the fifth nerve, also from a membranous expansion attached to the external apophysis of the basisphenoid, and is inserted into the inner border of the pterygoid bone within and behind the last muscle, extending as far backwards as the inner border of the os quadratum; but it is not actually attached to this bone. Is it possible that these two muscles represent the tensor and laxator tympani? Their origins correspond to a certain extent; but the insertions are different. It is true that the latter approaches very closely to the os quadratum, which, although not the malleus, is next door to it. They seem to present as much correspondence as can be expected in a skull so widely different from that of mammals.

Digastric.—A thin muscle arising from the posterior front of the parietal and squamosal, immediately in front of the exoccipital; it passes downwards over the latter and behind the os quadratum, and develops a slender tendon, which is inserted into the extreme posterior point of the articular piece of the mandible. This appears to correspond to the posterior belly of the digastric.

Pectoralis major arises from the whole length of the middle line of the sternum, from about the centre of the interclavicle, as far as the end of the xiphisternum. The posterior fibres also arise from the rectus abdominis by means of a tendinous intersection; it is inserted into the summit of a hook-like process on the lower and outer surface of the humerus immediately beyond the humero-scapular articulation, which appears to correspond to the greater tuberosity, and into the surface of the bone beyond it.

Deltoid arises from the lower anterior and upper surfaces of the inner or lower extremity of the clavicle; it turns back between it and the coracoid, passing in front of the former, and covering the anterior part of the shoulder; it is inserted into the outside of the humerus, immediately beyond the head of the bone and in front of the outside head of the triceps.

Supraspinatus arises from the anterior half of the coracoid, and is inserted into the anterior point of the head of the humerus, in front of the insertion of the pectoralis major. This is called epicoraco-humeral by Mr. Mivart; nevertheless I would venture to suggest that it corresponds to the supraspinatus, because it arises from the coracoid, and that process, attached as it is to the anterior part of the scapula, would point to the supraspinous fossa.

Teres minor arises from the anterior border of the scapula, at its junction with the coracoid, just dorsad of the coraco-scapular fenestra; it is attached to the capsule of the joint, and is inserted into the upperside of the head of the humerus, immediately beyond its articulation; it is bound down at its insertion by an aponeurosis attached to the long head of the triceps, and is covered over by the deltoid.

Infraspinatus arises from the whole upper border of the scapula proper in a semicircular manner; a few of the anterior fibres arise from the internal surface of the bone; the fibres converge, and are inserted into the outside of the humerus beyond its head, dorsad of the insertion of deltoid, the interior part of the insertion being between the insertions of the two last muscles. This appears to correspond with the infraspinatus, by the same line of argument; if the coracoid points to the supraspinous fossa, the scapula would point to the infraspinous fossa. Mr. Mivart has called it the second part of the deltoid; but in this animal it has a separate insertion from that muscle. In addition the above arguments in favour of this view, I would draw attention to the arrangement of the insertions of these three muscles, which correspond in a striking manner with the arrangement of the three analogous muscles in mammals.

Biceps is represented only by the coracoid head. It arises, broad and fleshy, from the anterior and inner half of the articular border of the coracoid, and from the surface of bone behind it. In passing over the shoulder-joint it developes a broad thin tendon; beyond that point it again becomes fleshy, and in the arm it is thick and round; it is inserted by a narrow tendon into the upper part of both radius and ulna, in conjunction with and on the distal side of the insertion of brachialis anticus.

Coraco-brachialis brevis arises broad and fleshy dorsad of the last, from the posterior and inner half of the articular border of the coracoid, and from the surface of bone outside it; passing close under the humero-scapular articulation, it is inserted into the inner side of the shaft of the humerus for nearly two-thirds of its length.

Coraco-brachialis longus arises behind this, from the posterior angle of the coracoid bone, and, passing down inside the arm, it is inserted, narrow, into surface of bone immediately above the inner condyle of the humerus.

Brachialis anticus arises from the whole length of the flexor surface of the humerus, commencing beyond the insertion of the supraspinatus, and is inserted entirely into the proximal part of the ulna, together with part of the biceps-tendon.

Trapezius consists of two portions, united together by a thin layer of muscular fibre. The anterior portion arises from the side of the complexus in conjunction with the neuro-mandibularis; the posterior part is attached to the general aponeurosis covering the dorsal muscles, extending back as far as the fourth dorsal vertebra: this part is inserted into the scapula immediately dorsad of the claviculo-scapular articulation; the anterior part is inserted into the upper third of the clavicle.

Latissimus dorsi arises from the spinous processes of the vertebræ, from the seventh, or last but one, cervical to the fourteenth dorsal, both inclusive; the anterior fibres are directed straight downwards, and the posterior obliquely downwards and forwards, to be inserted into the upper surface of the humerus, occupying one-third of its extent beyond the head.

Triceps has four origins, the outer section arising by two heads, one

from the humerus immediately beyond the insertion of the deltoid, the other dorsad of the insertion of the infraspinatus, commencing immediately distad of the insertion of the teres minor. The scapular section, or long head, arises from the posterior edge of the scapula, just above the glenoid cavity, by a flat tendon, which is further strengthened by an aponeurosis, which is attached to the head of the humerus, binding down the teres minor; the inner section occupies the internal surface of the humerus, commencing beyond the subscapularis, between coraco-brachialis and latissimus dorsi. The united muscular mass of these origins occupies the dorsal surface of the humerus, and is inserted into the proximal extremity of the ulna, developing a sesamoid bone or olecranon in the tendon.

Levator scapulæ arises by two heads, one from the scapula and clavicle, close to the articulation between those two bones, the other from the cartilaginous suprascapular; they pass forwards, and are inserted together into the transverse process of the first cervical vertebra or atlas.

Subscapularis arises from a small part of the outer surface of the scapula covered by the infraspinatus, and from the whole internal surface of that bone, with the exception of the posterior superior angle, and from the interior inferior angle of the suprascapula, also from the upper two-thirds of the inner surface of the coracoid; the fibres converge and are inserted into the inner and lower edge of the head of the humerus, close to the capsular ligament. This evidently corresponds to the subscapularis, and perhaps the dorsal part to the teres major, as it is partially separable from the remainder at its insertion, which is a trifle beyond that of the rest of the muscle.

Sterno-coracoidalis arises from the anterior and lower part of the internal and lower surface of the coracoid, occupying rather more than one-sixth of its superficies, slightly overlapping the edge of the last muscle, and is inserted into the antero-lateral edge of the sternum. Some of its fibres proceed further back, and are inserted into the anterior extremity of xiphisternum and into the cartilages of the second and third sternal ribs.

Serratus consists of two distinct parts. The anterior section arises from the whole length of the suprascapula, and, passing downwards and forwards, is inserted by three slips into the expanded terminations of the three anterior cervical ribs. The posterior section arises from the postero-inferior border of the scapula and suprascapula, and, passing downwards and backwards, is inserted into the extremities of the fourth and fifth cervical ribs. From this there is a continuation in the same direction to the xiphisternum and cartilages of the fourth and fifth sternal ribs, the whole being parallel with the fibres of the obliquus externus abdominis.

Flexor carpi radialis arises from the upper part of the inner or flexor condyle of the humerus, and from the proximal two-thirds of the radius, and is inserted into a bone of the carpus which appears to correspond with the scaphoid.

Flexor carpi ulnaris arises from the lower part of the inner condyle

of the humerus and from the whole length of the ulna, and is inserted into the pisiform bone.

Flexor sublimis digitorum arises from the strong tendinous arch, one end of which is attached to the pisiform bone and the other to the scaphoid, and from the palmar fascia; it immediately divides into five muscular slips, each of which is attached to a tendon of the flexor profundus and to the head of the metacarpal bone of its respective digit; although this is not perforated by the long tendon, it represents the perforatus, as it will be seen, when we come to the foot, that the corresponding muscle there allows the long tendon to pass between its two heads.

Flexor profundus digitorum arises from the middle portion of the inner condyle of the humerus and from the lower two-thirds of the ulna; passing beneath the annular ligament, it becomes developed into a broad expansion, which, in the palm, divides into four long tendons, going to the terminal phalanx of the pollex, second, third, and fourth digits. The fifth digit has a long tendon to itself, which is given off high up in the forearm.

Pronator quadratus arises from the whole length of the ulna, and is inserted into the distal half of the radius, occupying the place of the interosseous membrane.

Flexor accessorius digitorum.—There are four muscular slips which may be thus called; two of them arise from the tendinous expansion of the long flexor, and, forming very fine tendons, are inserted into the last phalanx but two of the third and fourth digits respectively. Two other slips arise from the bone of the carpus which appears to represent the cuneiform, and from others, in the first row; one of these joining the long tendon, developes, in addition, a tendon of its own, which is inserted into the penultimate phalanx of the second digit; it has also a muscular insertion into the base of the first phalanx of the same digit; the other slip is simply attached to the long tendon going to the pollex, without having one of its own.

Lumbricales.—There are five muscles which correspond to the lumbricales—viz. one on each side of the fourth, one on each side of the third, and one on the ulnar side of the second digit.

Abductor quinti digiti arises from the pisiform bone, and is inserted into the whole length of the ulnar edge of the metacarpal bone of the fifth digit.

Abductor pollicis arises from scaphoid, and is inserted into the whole length of metacarpal bone of pollex.

Beneath these there are five palmar interossei, which radiate from the first row of bones of carpus, and are inserted into the heads of the metacarpal bones of their respective digits, one for each.

Supinator longus arises from the lower third of the outer edge of the humerus, above the condyle, and is inserted into the distal two-thirds of the radius.

Supinator brevis arises from the outer condyle distad of the last, and is inserted into nearly the whole length of the radius.

Extensor carpi radialis arises from the outer condyle of the humerus next to the last muscle, and, forming a long slender tendon,

is inserted into the scaphoid bone of the carpus; it does not quite correspond to ext. carp. rad., but it does so more nearly than to any other extensor of the forearm.

Extensor carpi ulnaris arises by two heads, one from the distal extremity of the outer condyle of the humerus, the other from the proximal half of the ulna; it is inserted into the pisiform bone and the base of metacarpal of the fifth digit.

Extensor communis digitorum arises tendinous from the outer condyle between the last two muscles, and muscular from the whole length of the ulna, as far as its distal articulation; in the middle of the forearm it forms a thick fleshy mass, which soon divides into three broad tendons, which are inserted into the heads of the second, third, and fourth metacarpal bones; the one to the second sends a slip to be attached to the fascia covering the metacarpal bone of the pollex; in another specimen this part was divided into two, giving the appearance of five tendons instead of three.

Interossei dorsales.—Each digit has two dorsal interossei, one on each side; they are inserted into the penultimate phalanx, being united together on the dorsum by a raphe; this is a feature they all have in common. Their origins are as follows:—The one on the ulnar side of the fifth digit arises from metacarpal bone of the same; that of the radial side from the tendon of the extensor digitorum, and also from the same metacarpal bone. The one on the ulnar side of the fourth digit arises from the same tendon with last, and also from its own metacarpal bone; the radial one of this digit from its own metacarpal bone. The one on the ulnar side of the third digit from the middle tendon of the extensor and its own metacarpal bone; the radial one of this digit from the ulnar side of the head of the metacarpal bone of the second digit. The ulnar of the second digit from its own metacarpal bone and extensor tendon; its radial from the metacarpal bone of pollex in conjunction with the single one belonging to the latter.

Extensor ossis metacarpi pollicis arises from the distal end of the ulna for one-fourth of its length, and passing across the forearm it is inserted into the whole length of the radial side of the metacarpal bone of the pollex.

Extensor brevis digitorum arises from the bone of the carpus representing the cuneiform, and immediately divides into five slips; the first passes across the hand to be inserted into the base of the first phalanx of the pollex; each of the other four slips ends in a slender tendon, which is inserted into the penultimate phalanx of each of the other digits.

Complexus is the superficial muscle of the back of the neck. It is a distinct continuation forward of the longissimus and spinalis dorsi, and is inserted into the fascia covering the temporal muscle, into the supraoccipital and neural spine of the first vertebra, and also into the membrane which fills up the space between the parietal and the supra- and exoccipitals.

Trachelo-mastoid is a continuation forward of the longissimus dorsi. It also arises from the zygapophysis of the first cervical

vertebra, and from the furrow between the zygapophyses and transverse processes of the two following vertebræ. It is inserted into the lower border and external end of the exoccipital.

Cervicalis ascendens is the continuation forward of the sacro-lumbalis. It also arises from the surface of the second and third cervical ribs, and is inserted into the transverse process of the first cervical vertebra and basioccipital above the insertion of the longus colli.

Sacro-lumbalis arises from the posterior extremity of the ilium, and is attached to all the ribs between the points corresponding to the angles and the insertion of the longissimus dorsi.

Longissimus dorsi begins at the transverse process of the fifth caudal vertebra, interdigitating with the first caudal muscle; it has an attachment to the posterior end of the ilium, and is inserted into the bases of all the ribs between the last muscle and the zygapophyses of the vertebræ as far forward as the fourth cervical.

Spinalis dorsi commences between the inner point of the first caudal muscle and the neural spine of the fifth caudal vertebra, and is inserted into the neural spines of all the vertebræ as far as the fourth cervical, occupying the space between the neural spines and the zygapophyses; a small slip is continued forward beyond the fourth cervical, attached to the neurapophyses of the three anterior cervical vertebræ.

Rectus posticus arises from the neural spines of the second, third, and fourth cervical vertebræ; it is directed outwards, and is inserted into the upper and inner surface of the exoccipital, within and above the trachelo-mastoid.

Rectus anticus major arises from the point of the external apophysis of the basioccipital, and is inserted into the hypapophysis and side of centrum of the first cervical vertebra, and in the same way into the rest as far as the sixth, and into the side of the centrum of the seventh.

Scalenus arises from the side of the centrum of the second cervical vertebra dorsad of the last muscle, and is inserted into the cervical ribs from the first to the fifth, enclosing them in a triangular muscular mass, also into the sides of the bodies of the vertebræ belonging to these ribs; behind it is continuous with the intercostals.

Rectus abdominis arises behind from a tendinous arch extending from the hook-like process of the pubis in front of the femoro-pelvic articulation to the ischium, which might be called ischio-pubic ligament, and is inserted by means of a fibrous membrane into the posterior extremity of the xiphisternum, and into the cartilage of the sixth sternal rib. It has six tendinous intersections running transversely across its fibres and occupying the whole thickness of the muscle. An offshoot is given off just beyond the most posterior intersection, which goes to be inserted into the hook-like process of the pubis; this appears to represent the pyramidalis.

External oblique arises by fourteen digitations, each loosely attached to a rib at the external edge of the sacro-lumbalis; the first digitation belongs to the seventh cervical vertebra, towards the middle line; it is inserted behind to the hook-like process of the

pubis, and in front to the sides of the rectus abdominis; its fibres are directed from behind forward and towards the dorsal surface.

Intercostals are the layer of muscles next internal to the last; they are united behind with the internal oblique and transversalis to form an arch over the external and back part of the thigh; they occupy the spaces between all the ribs from the sides of the rectus and sternum to the vertebræ, anteriorly they are continuous with the scalenus; their fibres are directed forward and slightly towards the dorsal surface.

Internal oblique and transversalis are situated between the ribs and the viscera. Posteriorly they are united together and to the intercostals as above mentioned; dorsad they are attached to the angles of the ribs internally, at the place where the external oblique is attached externally; ventrad they are attached to the side of the rectus abdominis, and, in front of that, to the end of the fourth sternal rib, to the xiphisternum, and to the postero-lateral edge of the sternum. Anteriorly they extend as far as the fourth cervical rib. The fibres of the internal oblique are directed obliquely forwards and towards the ventral surface; those of the transversalis go transversely across the body.

Quadratus lumborum arises from the anterior edge of the sacrum. It is attached to the sides of six lumbar and the last dorsal vertebræ, and encloses all the lumbar ribs in a thick muscular mass, which terminates anteriorly at the last dorsal rib.

Retrahentes costarum line the whole dorsal surface of the abdominal cavity in front of last muscle. They consist of muscular slips separable by dissection, each arising from a centrum of a vertebra, and passing ventrad of the rib of its own vertebra; and that of the next one in front is inserted into the next but one, interdigitating with the transversalis and internal oblique; the most anterior one is attached to the centrum of the first dorsal vertebra and to the fourth cervical rib, and the last to the twelfth dorsal.

Sartorius occupies the greater part of the ventral aspect of the thigh. It arises from the hook-like process of the pubis in front of the acetabulum, also from the whole length of the ilio-pubic ligament; it has a broad muscular insertion into the lower or inner side of the tibia, occupying one quarter of its proximal end.

Gracilis arises from the side of the ischial symphysis and from the ventral part of a tendinous intersection which connects the posterior point of that bone with the posterior end of the ilium, and which seems to represent the tuber ischii; it is inserted partly tendinous and partly fleshy into the tibia, beneath the last muscle.

Transversus perinei is a small muscle in front of the cloaca, arising from the proximal side of the above-mentioned tendinous intersection, and is inserted into a cartilaginous rod attached to the posterior end of the ischium, and into the skin anterior to the cloaca.

Semimembranosus arises from the tendinous intersection dorsad of the gracilis, and is inserted into the tibia on the inner side of the internal lateral ligament, and nearer the head of the bone than the gracilis. There are two separate muscles which, perhaps, represent

the ligament of Winslow and the popliteal aponeurosis: the one arises from the tendinous intersection in common with the semimembranosus, and is inserted by a long tendon into the external side of the head of the tibia, between it and the head of the fibula, in immediate contact with the joint; the other arises from ischium, in front of and close to the last, and is inserted by a shorter tendon into the interarticular cartilage of the joint.

Semitendinosus arises, in conjunction with semimembranosus, from the tendinous intersection, and is inserted by a broad thin tendon into the head of the tibia.

Pelvo-tibialis arises from the edge of the pubis at a point behind the hook-like process of that bone, to which it is attached by a strong aponeurosis, and passing obliquely across the thigh it reaches the popliteal space, where it suddenly becomes tendinous and penetrates the knee-joint, being inserted into the head of the tibia between it and the fibula, external or anterior to the attachment of the section of semimembranosus mentioned above. This appears to correspond in insertion to the muscle called "biceps" by Mr. Mivart; but in this animal it is quite on the ventral aspect of the thigh; so I have ventured to give it a distinct name.

Pectineus arises by a membranous expansion, attached to the anterior point of the ischial symphysis and to the ischio-pubic ligament, and is inserted into the ventral surface of the shaft of the femur, occupying about the middle third.

Rectus femoris arises by two heads:—one from the surface of the pubis immediately anterior to the cotyloid cavity, and from the capsule of the hip-joint; and the other from a varying extent of the ilium, in this case from two-thirds of its length. They join together and form a fleshy mass covering the anterior and dorsal surface of the thigh; the whole is inserted into the tuberosity of the tibia by means of a tendon containing a sesamoid bone. Being unable to decide whether the iliac origin of the muscle represents the gluteus maximus or not, I have preferred to leave the text as it has been written.

Biceps femoris arises from the ilium immediately behind the superior origin of the rectus; it is inserted into the fibula on the proximal side of its central point by a flat tendon, which is covered by the peroneus brevis.

Coccygeus.—There are three muscles which have attachments corresponding to this muscle. The one which may be called *superior* arises from the extremities of the transverse processes of the five anterior caudal vertebræ, and is inserted into the posterior extremity of the ilium; it has two interdigitations with the first caudal muscle.

Coccygeus medius arises from the sides of the six anterior caudal vertebræ ventrad of the transverse processes, and is inserted into the tendinous intersection internal and behind the semitendinosus, its anterior border forming a straight line from that point to the first caudal vertebra. In the *Iguana* Mr. Mivart calls this the pyriformis; but here it has not the slightest attachment to the femur, and so could hardly represent that muscle.

Coccygeus inferior arises from the hæmal spines of the third, fourth, and fifth caudal vertebræ, and is developed into a broad vertical tendon attached to the centra of the first and second caudal vertebræ, and to the sacrum, which with its fellow of the opposite side forms a partition between the two halves, embracing and being attached to the posterior end of the cloaca; the anterior extremity of the free edge of this tendon is inserted into the postero-external angle of the ischium.

Pyriformis is situated between the coccygeus medius and inferior, arises from the centra of the first six caudal vertebræ, and from the hæmapophyses of the third, fourth, fifth, and sixth, and passing forward through the tendinous intersection it ends in a flat tendon, which winds round the trochanter, and is inserted into the femur at its base on the anterior surface; before arriving at the femur it gives off a long and slender tendon, which passes down the thigh to join the aponeurosis covering the flexor muscles of the leg.

Quadratus femoris arises from the posterior point of the ilium, between the origin of the biceps femoris and the insertion of the coccygeus superior; passing directly towards the ventral surface, it joins the tendon of the last muscle, and in addition is inserted into the posterior edge of the trochanter by a tendon of its own.

Iliacus arises from the concave ventral surface of the pubis and from the membrane, filling up the space between it and the ischium; superficially it is divisible into three portions; but the divisions do not run deep; the fibres converge and are inserted into the summit of the trochanter, having somewhat the aspect of the subscapularis. I have ventured to call this iliacus on account of its insertion, its origin, although coming from the proper direction, being from a different bone to the one it ought to be in order to make the analogy complete.

Adductor brevis.—This muscle regarded superficially looks as if it formed part of the iliacus; but dissected deeper it is found to have a separate insertion; it arises from the side of the ischium, and is inserted into a fossa on the dorsal side of the trochanter, internal to the insertion of the quadratus femoris.

Capsularis arises from the postero-lateral margin of the ischium, covered by the last muscle, and is inserted into the dorsal part of the capsular ligament of the femoro-pelvic articulation.

Adductor magnus arises on the internal or dorsal surface of the pelvis by three heads:—one from the anterior border of the ischium; the other from the internal surface and anterior edge of the pubis, appearing on the ventral aspect; the other from the membrane between the two bones. The fibres converge, and passing over the front of the ilium through the arch formed by the abdominal muscles are inserted into the ventral aspect of the shaft of the femur for nearly one-half of its length, ventrad of the crureus and dorsad of the pectineus. The action of the muscle being to adduct and flex the thigh upon the pelvis, it seems more nearly to correspond with the adductor than with any other.

Gluteus medius arises from the ilium, in front of the origin of the

biceps femoris, and is inserted into the dorsal surface of the femur dorsad of the crureus, on a line corresponding to the insertion of the last muscle; in its course it is situated in close juxtaposition to the capsular ligament of the hip-joint.

Vastus and crureus.—The externus arises in intimate fusion with the crureus; it commences narrow immediately behind the head of the femur, between the insertions of the adductor magnus and the gluteus medius, and covers the outer and upper surface of the bone. The internus is smaller, and arises from about half the ventral surface of the femur. They are inserted with the rectus into the patella.

Extensor tarsi arises from the middle half of the tibia, being superficial to all the other muscles of the flexor side of the leg; it crosses the limb obliquely, and is inserted into the base of the metatarsal bone of the fifth digit, and fascia covering the tarsus.

Flexor perforatus arises narrow from the fibular condyle of the humerus, and, forming a broad muscular mass in the leg, it is inserted partly tendinous and partly muscular into an apophysis of the cuboid bone of the tarsus, and is continued into the plantar surface of the foot by means of five muscular fasciculi, which are inserted into the metatarsal bones by two heads, between which the long flexor-tendons pass; the one belonging to the fourth digit is also inserted into the base of the first phalanx; that of the fifth has in addition an attachment along the whole length of its metatarsal bone.

Flexor longus digitorum arises from the peroneal condyle of the humerus in conjunction with the last, and also from the interarticular cartilage of the knee-joint, also from the proximal half of the fibula; it is inserted into three-fourths of the length of the tibia, which part, perhaps, represents the popliteus. Continuing down the leg it developes a broad tendon, occupying the plantar surface of foot, dorsad of the last; here it divides into four long tendons, which are inserted into the terminal phalanx of the pollex and of the second, third, and fourth digits; the long tendon belonging to the fifth digit is given off from the muscle about the middle of the leg, and, passing round the projecting apophysis of the cuboid, goes to the terminal phalanx of that digit.

Flexor accessorius digitorum.—There are four muscular slips which may be collectively called by this name. The one belonging to the fourth digit arises from the tendon of the long flexor going to that digit, and gives off a tendon of its own inserted into the base of its third phalanx; the slip belonging to the third digit arises from the cuboid bone; those of the second and hallux from the cuneiform (these join the long tendon); those of the second and third digits have in addition slender tendons, which are inserted into the second phalanges of those digits.

Lumbricales.—There are five—one on the peroneal side of the second digit, one on each side of the third digit, one on each side of the fourth digit.

Adductores digitorum form the third layer in the sole of the foot. They consist of four muscular slips arising from the cuboid; three cross the plantar surface and are inserted into the peroneal side of

the base of the first phalanx of the hallux, and of the second and third digits; the fourth is inserted by two heads, one of which goes to the head of the metatarsal bone, and the other to the side of the first phalanx of the fourth digit.

Interossei plantares.—Four in number; three fill up the spaces between the metatarsals of the first three digits, the fibres going obliquely from the fibular to the tibial side; the other arises from the cuboid and goes to the metatarsal bone of the fourth digit without entirely filling up the space.

Tibialis anticus is visible both on the flexor and extensor sides of the leg; it arises from the surface of the tibia for nearly its whole length, and is inserted into the metatarsal bone of the hallux.

Peroneus longus arises from distal half of the fibula on the flexor side, and is inserted fleshy into the cuboid close to its articulation with the fifth digit; from this it gives off a broad tendinous expansion, which is inserted into the cuneiform bone, covering the tarsus beneath the flexor tendons; from its extreme point on the tibial side arises a small muscle, which is inserted into the head of the metatarsal bone of the hallux.

Peroneus brevis arises from the distal two-thirds of the outer surface of the fibula, and is inserted into the cuboid bone of the tarsus; it also sends a tendon to the back of the foot, which is inserted into the extremity of the metatarsal bone of the fourth digit.

Extensor longus digitorum arises from the anterior aspect of the peroneal condyle of the femur by a flat tendon; it forms a thick belly in the leg, partially divisible into two, and ends by two flat tendons, which are inserted into the metatarsal bones of the second and third digits. If this muscle were situated in the forearm it might be called ext. carp. rad. long. et brev.

Extensor ossis metatarsi hallucis arises from the distal end of fibula, and crossing the tarsus is inserted into the whole length of the tibial side of the metatarsal bone of the hallux.

Extensor brevis digitorum arises from the peroneal side of the bone of the tarsus corresponding with the united astragalus and calcaneum. It consists of four radiating fasciculi: the first crosses the foot and ends in a tendon, which is inserted into the penultimate phalanx of the hallux; the second is inserted in like manner into the penultimate phalanx of the third digit, the third into the third phalanx of the fourth digit; the fourth fasciculus is intimately united to the dorsal interosseus of the fifth digit, its tendon being inserted into the second phalanx of that digit.

Interossei dorsales.—Two muscles arise together from the dorsal surface of the metatarsal bone of the hallux: one goes to the tibial side of the hallux, being inserted into the whole length of its metatarsal bone and phalanges; the other goes to the tibial side of the second digit. The interosseus of the fibular side of the hallux arises from the tibial side of the metatarsal bone of the second digit. Two muscles arise together from the dorsal side of the second metatarsal bone: one forms an extensor for that digit, and is inserted by a long tendon into its penultimate phalanx; the other forms an interosseus

for the tibial side of the third digit; this latter arises in addition from nearly the whole length of the metatarsal bone of the second digit. The interosseus for the fibular side of the second digit arises from a small portion close to the head of its own metatarsal bone, left unoccupied by the last muscle; the one for the fibular side of the third digit arises from the whole length of the same side of its own metatarsal bone; the one for the tibial side of the fourth digit arises from the same side of its own and the base of the metatarsal of the third digit; that of the fibular side of this digit arises close to the head of its own metatarsal bone on the same side. The interosseus of the fibular side of the fifth digit arises from the cuboid; that of the tibial side from the extremity of the fourth metatarsal bone and from the whole length of its own. These are all attached to the sides of the phalanges of their respective digits, uniting together over the dorsum, and are inserted into the penultimate phalanx, precisely in the way that occurs in the hand.

7. Notes on the Skeleton of a a rare Whale, probably identical with *Dioplodon sechellensis*. By GERARD KREFFT, C.M.Z.S., F.L.S., &c.

A few days ago I purchased for the Australian Museum the nearly perfect skeleton of a small Whale, which I believe is the *Dioplodon sechellensis*, whereof the skull and lower jaw only have been yet known. The specimen is not yet cleaned; but I do not wish to delay giving a short account of the number and size of its vertebræ and ribs. The total length of the skeleton, without cartilage, is 14 feet 8 inches; the head measures 2 feet 5½ inches in length, and the lower jaw 2 feet 3 inches in length. The first three cervical vertebræ are anchylosed; the next one is more or less free; and the remaining three are anchylosed again. The dorsals are ten in number, the last bearing a short rib 8 inches in length. Five of these ribs are jointed direct to the sternum; the following two meet the cartilage of the fifth rib.

The sternum is composed of four pieces 20 inches long, with a width of between 5 and 7 inches. It is not yet sufficiently cleaned to enable me to have it photographed; this, however, will be done as soon as possible, and copies forwarded to the Society. The lumbars number twenty, the last nine having V bones attached. The fifth lumbar is 17½ inches high, 4 inches wide at the top, and 11¾ inches at the base, including the side processes. The eleventh lumbar is the widest, being 4¾ inches at the top.

The caudals probably amounted to 13; but five of these are missing; the base one is very small, about the size of a pea; and as it was firmly attached to the second last, there can be no mistake about it.

The head is 2 feet 5½ inches long and 14 inches across at the widest part; the lower jaw 2 feet 3 inches long and 6¼ inches high

behind the tooth. The left tooth measures 6 inches in length, $3\frac{3}{8}$ inches in width, and is $1\frac{3}{4}$ inch thick. The space between the teeth measures $7\frac{1}{4}$ inches. The limbs are very imperfect; all the smaller bones are missing; and there is only a part of one scapula. I did not find the pelvic bones.

This animal was captured about a year ago, near Lord Howe's Island.

8. Zoological Notes of a Journey from Canton to Peking and Kalgan. By R. SWINHOE, F.Z.S.

On my return from Hainan in April 1868 I visited Canton. In the market there three species of White Herons (*H. alba*, *H. garzetta*, and *H. intermedia*) were to be seen, with eyelids stitched together, walking about the counters of the bird shops—the bills of the first and last in different stages of black and yellow, changing from the winter to the summer colour—all with the nuptial plumes fully developed. Parrakeets with red cheeks (*Palæornis longicauda*?) were in abundance. The dealers told me that they were brought from the western portion of the province, down the west river. *Polyphasia tenuirostris* was often heard whistling in the neighbourhood. It has a quick undulatory flight as it flits from tree to tree, and has two other series of notes besides its ordinary call.

We pulled down the river and went on board a Customs' revenue cruizer to call on a Mr. S. Bligh, formerly a naturalist in Norfolk, who was serving on board. He had a tolerable collection of neatly prepared skins made on the Canton river. He had fine specimens of both *Herodias alba* and *H. intermedia*; and drew my attention to the fact that the latter lacked the pink garters which the former carries on the top of its bare *tibiæ*. He had also a large Goose with flesh-coloured bill and white dertrum and yellowish flesh-coloured legs; tail broadly margined with white, and belly blotted with black; apparently a race of *Anser ferus*. He had besides several of *Totanus fuscus*, L., which he assured me was very common during winter on the Pearl River. The best thing I got from him was a solitary specimen of a new species of *Porzana*, which I have lately described in the 'Annals and Magazine of Natural History' (March 1870, p. 173) as *Porzana mandarina*. He showed me a *Calamoherpe orientalis* (T. & S.), which he said was just beginning to arrive. There were certainly plenty of Reed-warblers about then; for the river-banks resounded with their notes. Mr. Bligh believed that both *Anas circia*, L., and *Anas sonorhyncha*, mihi, breed in the neighbourhood of Canton.

The Commissioner of Customs at Canton had a nice aviary, with several birds of interest in it. Of domestic things, the most curious was a full-grown Duck (cross between a Muscovy and the common Chinese or Penguin Duck) of a piebald colour, with *four* legs. The foremost pair were normal; the hind pair hung obliquely

backwards soles upward, and shook up and down with every movement of the bird, having apparently no muscular power. Among the wild captives were a pair of my *Porphyrio cœlestis* from the Canton neighbourhood, and a Pelican (*P. minor*, Rüpp.) with yellowish bill and legs, which had lived in the aviary for two years or more but still retained the greyish-brown markings to its feathers. It sat for the greater part of the day on a perch, with its head back and its bill on its breast. There was another bird, which interested me most of all; and that was an Ibis said to have been winged on the Canton river. I noticed at once that it was my undetermined friend of Talienwan (Ibis, 1861, p. 261). It was very like *Ibis religiosa*, having, like it, a purplish-black bill, bare head and neck, the latter not bare to such an extent; entire plumage white, lacking the black tips to the wings and the desiccated purple plumes that adorn the back of the other. Its pectoral feathers were long and pointed, like in *Herodias garzetta*. It was about the size of *I. religiosa*, and had similar legs. I could not handle the specimen, and cannot, therefore, give measurements. I before supposed the Chinese species to be the Indian representative of the Egyptian sacred fowl *I. melanocephala* (Linn.) (P. Z. S. 1863, p. 60); but Jerdon's description (B. of I. iii. p. 768) shows that to have black quills. There seems no doubt, therefore, that our species is a novelty; and I would propose to recognize it as *Ibis propinqua*. The live specimen in the aviary at Canton, as I have just noted, did not show the peculiar dark decomposed scapulars and tertials of the two allied species, nor did the birds which I saw in Talienwan.

On my way up from Hong Kong to Shanghai, off Video Island (near Shanghai), I saw (15th May) a Black Petrel the size of a Duck, and a small flock of Guillemots. A Swallow followed us for the greater part of the day; and a *Lanius lucionensis*, Strickl., flew on board. In the grounds of the Shanghai Consulate they have a very fine pair of *Grus montignesia*, Bp., that have the run of the place. They are very tame and bold, and have lived there many years. I saw them on my first visit to Shanghai in 1858. In the bird-shops of Shanghai there were plenty of White-eyes (*Zosterops erythropleurus*, mihi), Pihlings (*Alauda mongolica*, Pall.), and Hwameis (*Leucodiopterum sinense*, L.)—also numbers of *Suthora webbiana*, G. R. Gray, caged separately and kept for fighting. The domestic Cormorant was also offered for sale, and the bodies of some small shore birds, from strings of which I was glad to secure *Ægialites geoffroyi* (Wagler) and *Æg. mongolus* (Pall.) in full summer plumage. A friend showed me a collection of fossils purchased at Shanghai. He had some fine Orthoceratites obtained from the curiosity-shops; the Chinese believe them to be natural photographs of pagodas. His collection of fossil teeth were procured at the druggists, where they are sold for medicine. Shanghai is a great centre for this trade; and the raw article can be procured here in quantity. In other large towns you can only get the prepared drug in a calcined state. These fossils are called *Lungche*, or "Dragon's teeth;" and the idea about them is that in olden time the world consisted of

monsters who were incessantly fighting and killing one another, until man came on the scene and initiated a more peaceful state of things by clearing the country and cultivating it. The monsters were large and powerful brutes; and in their teeth and bones existed their strength; hence the remains of these ground to powder and taken internally must give strength to the weak invalid. For the same purpose Tiger's bones are also in favour. Mr. Kingsmill had managed to get together a very nice series. He had also specimens, chiefly of fossil plants, of his own collecting.

At Chefoo, on the 21st of May, all the Gulls I saw about the harbour were *Larus melanurus*, Temm. et Schleg.

About Tientsin, on the 25th of May, Swifts were abundant.

On the 27th I arrived at Peking, and learned, to my great annoyance, that Père David had left the same morning for Tientsin on his way south. He was bound on a three years' exploring tour into Szechuen, bordering Thibet. I had counted on his assistance in working the northern birds, and his departure was a great blow to me. I nevertheless lost no time in visiting the Lazarist mission called Paitang, near the north-west gate of the Tartar city. The priests were very polite and courteous, and led us to the museum; but none of them knew any thing about the treasures it contained: the soul of the place was gone. We were escorted into a building on the left of the cathedral; and judge of my surprise when I found myself in a large room with glass cabinets all round and glass-faced tables up and down the middle, as neatly got up as in any museum in Europe. Three sides of the room were devoted to birds and mammals, the cabinets being divided by horizontal shelves, on which were placed specimens elegantly mounted on stands. The fourth, or side through which we entered, exhibited astronomical and other instruments, and an assortment of minerals. The tables contained Butterflies and Beetles pinned and arranged. The zoological specimens were for the most part from the neighbourhood of Peking, and had been collected by the Père Armand David. The zeal and enthusiasm of the Abbé for scientific pursuits must indeed be great to have enabled him to accomplish all we saw before us, in a remote place like Peking, in the space of four and a half years; and how commendable the liberality of a religious mission to give so much space, labour, and money for providing a kind of instruction to the youths of their school which in England and Europe generally is considered of a very secondary and even unnecessary character! I trust many of the Chinese pupils will be won over by the attractions of the museum to the study of the natural history of their country; but I fear it is a vain hope. The priests told us that the natives took very little interest in the prepared specimens. I paid during my stay in Peking three visits to the museum. The priests were surprised at my coming so often; but I could have spent weeks there to advantage. All the species that Père David had collected were not there. They told me that he had sent large collections to Paris, and that none remained but those here exhibited. How I longed for the worthy

Father himself to go over his treasures with me. I jotted down a few notes, which I will here insert.

A very fine series of Eagles and Hawks; and among the former a large *Gypaëtus barbatus* with pale underparts. A female *Cercus melanoleucus*, of a rich brown colour.

Troglodytes europæus (?). Apparently the same as the Japanese species, *T. fumigatus*, Temm.

Pericrocotus brevirostris, so marked.

A Redbreast with red head and neck, with black line across breast, grey sides, red tail; Robin green above, with white belly = *Lusciola akahige* of Japan.

Lanius excubitor, var., in different stages of plumage.

Lanius phœnicurus, with the head dull brownish, forehead grey = *L. lucionensis*; and one specimen of the species I have lately described from Szechuen as *L. waldeni* (P. Z. S. 1870, p. 131).

A Warbler from Mongolia, like *Sylvia curruca*, with black ear-coverts and whitish outer tail-feathers, marked *Sylvia cinerea*.

Locustella certhiola (Pall.), from the neighbourhood of Peking; and a Warbler from the same locality like *Nisoria undata*, Bp., but much less banded on the underparts.

Passer ouratensis, with black round the bill and down the throat, from the Oulashan; also *Passer petronius*, L.

Mecistura ouratensis. Two young examples from Oulashan.

Parus ouratensis. An ugly dusky-backed species with a black crown, also from Oulashan (= *P. sibiricus*).

One specimen of my new *Ægialites hartingi* (P. Z. S. 1870, p. 136).

Another large Sand-plover, with white head and neck, red breast succeeded by a black band, white belly; above brown. This I take to be the full summer plumage of *Charadrius veredus*, Gould.

The most interesting thing in the collection, of which M. David had procured but the single example mounted in the Peking Museum, was a peculiar Swan, bought in the flesh in the market at Tientsin. M. David did not acquire a duplicate; and it has therefore not been forwarded to Paris. The priests at Paitang gave me permission to describe it; and as it is such a remarkable species I regard it as a duty to make its existence known to the Society. It is smaller than *Cygnus bewickii*, Yarr., with the neck about a third shorter, is entirely white, with the bill vermilion colour having a black dertrum, and the legs and feet orange-yellow. Specimens of *C. musicus* and *C. bewickii* were ranged alongside. Its nearest ally, of course, is *C. coscoroba* of Chili; but it is larger than that, and has the wing white throughout. It would appear to be the northern representative of that curious form of Swan; and I would propose to name it, in honour of its discoverer, as the *Cygnus* (*Coscŏroba*) *davidi*, n. sp.

The mounted Mammals were:—An adult and a younger sample of a Leopard from the western hills—doubtless the *Leopardus chinensis*, Gray, founded on skulls brought from Peking by Dr. Lockhart (P. Z. S. 1867, p. 264), which, from skins of old and young brought

home by myself, I showed to be the same as the *L. japonensis*, Gray, P. Z. S. 1862, p. 262 (*vide* P. Z. S. 1870, p. 4).

Cervus capreolus, L., var. *pygargus*, Pall. A specimen without horns, white rump and tail; from Pechili (the province in which Peking is situated). The French legation had a number of these alive, and they bred in confinement. The British legation had a couple of bucks. They are small Deer, of a deep yellowish-brown colour finely speckled with black, the rump marked as before said. Their horns are covered on the beam with short spinous processes.

A long-tailed *Capricornis* from the western hills.

Antilope gutturosa, Pall., from Mongolia.

Lepus tolai, Pall., from near Peking.

Gerboas from Seuen-hwafoo (marked *Dipus jaculus*, Pall.).

An olive-brown Squirrel (marked *Myoxus cinereus*).

A Badger very white about the neck.

A small *Arvicola*, 3½ inches long, 1 inch tail; back red, with black dorsal line; sides and underparts white.

Mustela sibirica, *M. foina*, and light-brown Mole-rat.

Mus decumanus, *M. minutus*, and a Hedgehog.

A *Spermolegus* marked as a *Cricetus*.

A small short-tailed Fox.

A kind of Wild Cat closely allied to *Felis catus* of Europe.

And a fine pair of horns of *Elaphurus davidianus*.

These were all the Mammals exhibited. M. David must have consigned most of his collections in this branch to the Paris Museum.

The dust and heat were insufferable; and the great city is of such a huge extent that there was no getting out of it for a run into the fields without making a day of it. I was tired of watching the Rooks and Sparrows disporting themselves among the trees of the legation, and the myriad Swifts that were constantly skimming the air above, and of listening to the melancholy moaning of the Pigeons that flew in flocks round and round. (The Chinese attach little hollow gourds, or light reed-pipes slit at their tops, to the base of the Pigeon's tail. These face the wind and produce æolian music as the bird flies. In every flock two or three Pigeons carry these whistles.) Closed in by its lofty walls, one feels buried in Peking. It requires a gale to make a free circulation of air; and then the dust overwhelms you and penetrates every part of your person and every nook of your house. To lay the dust many of the main thoroughfares are watered with human urine for lack of water. One longed for wings to rise above the close and unwholesome atmosphere, and envied the Swifts.

On the 2nd of July I was enabled to find relief in the western hills, where large temples abound, situated at all heights, in picturesque places, and where among the trees and grassy slopes the cool breeze searches you out and makes you feel a different being. The Europeans in Peking find life insupportable in the city during the great heat of the summer; and most of them spend the greater part of that season among these hills—parties of them uniting and fitting up the native temples. Some go to the nearest hills (twelve miles

west of the city), others further westward. The diplomatic corps of the various nations, and even the missionaries, all retreat, the junior members of the legations taking it in turns to reside in town to report on occurrences and to keep up communications. Thus by the end of June the members of the British legation had migrated to their summer habitat; and I was glad to avail myself of an invitation to follow. The temple I visited on this occasion was the Black-Dragon Temple, over the first range of hills to the left of the gardens of the Summer Palace, and about twenty miles from the legation in Peking. The Black Dragon is the deity the Chinese appeal to on occasions of great drought; and such an occasion had occurred before my arrival in Peking. The mandarins were in great trouble because the heavens proved obstinate. They prohibited the slaughter of animals for food and tried every form of prayer, but in vain. At last one of the wise men suggested that the ancient manner of appeasing the wrath of the Black Dragon was to offer him a Tiger's skull. Peking was searched for the article; but the medicine shops had it only in the form of powdered drug. The Inspector-General of Customs asked if a Tiger's skin would do as well, as he had one which he would sacrifice for the purpose. Nothing but a skull was acceptable. At last one was secured, and with great ceremony carried to the temple and sunk in the pretty pool overshadowed by trees within its walls. In the evening clouds began to gather, and the next day there were copious and refreshening showers. I was in hopes of finding this skull, as I was very anxious to get a skull of the northern Tiger in order to determine whether it be the same species as that of Bengal; but some one had been before me, the skull was gone.

On our way outside the Tihshing Mên, or "Gate of Victory" (the gate the British troops occupied in 1860), we came upon a large patch of reeds and rushes with its noisy inhabitants. They consisted of two species of reed-birds—the *Calamoherpe aëdon* (Pall.), and a smaller bird something like our Reed-wren. The latter was very abundant, chattering in all directions; but it was not easy among the reeds to procure specimens. I shot a female; and, judging from her bare belly and worn appearance, she must just have left the nest. The male hopped down a rush to look at her; and several others appeared, to learn the cause of the disturbance. Before I had reloaded they had all retired again. I had not more time to devote to them. The specimen procured is a Reed-wren allied to *Calamoherpe arundinacea*, Gmel., and *C. dumetorum*, Blyth, in colour, but may at once be distinguished from the former by the band of dingy cream-colour that crosses the loral space extending from the nostril to the eye,—and from the latter by its white throat and breast; it has a thicker bill, shorter wing with longer first primary and different proportions of the other primaries, more graduated tail, and paler legs. I will introduce it as the

CALAMOHERPE CONCINENS, sp. nov.

Upper parts olive-brown; lore cream-white; cheeks and sides of

neck light ochreous brown; wings and tail light brown, edged with reddish olive-brown; underparts, axillaries, and carpal edge cream-white; under edges of quills light salmon-colour; tibials and vent yellowish brown; bill brown on upper mandible, ochreous on lower; legs ochreous flesh-colour, browner on the toes, with brown claws.

Length 5·2 inches. Wing 4·1, first primary measuring ·55 in length and being ·8 shorter than the second, which is ·2 shorter than the third, which is ·05 shorter than the fourth, which is slightly longer than the fifth and the longest in the wing. Tail 2·3 inches, much graduated, the outer rectrix being ·5 shorter than the middle; subcaudal coverts fall ·85 short of end of tail. Bill in front ·45, to rictus ·67. Tarse ·84. Outer toe rather longer than the inner; middle toe ·5, its claw ·21; hind toe ·33, its claw ·25.

On the 2nd of July we walked across the valley to the range of hills about six miles distant, to a magnificent temple called *Tacheo-sze*, where the Prussian legation had temporary quarters. The Lark of these intermontane valleys is a crested species—the *Galerida leautungensis* (mihi). They rose on all sides about us, making the country resound with their short sweet notes. They seldom rose more than forty or fifty yards from the ground. Their more frequent custom is to sing on the ground; and then their notes have quite a ventriloquistic effect. This was their breeding-season, and they were very merry. I saw them dusting themselves in the road as Skylarks are wont to do. The other conspicuous bird of these valleys is the Black Drongo, *Dicrurus macrocercus* (Vieill.). The willow is the chief tree; and among the groves of them the Black Drongo shares habitancy with the Sparrow, *Passer montanus* (L.). A pair of the former had a nest on the slender top twigs of a willow; one bird was sitting, and I watched its mate relieve it and take turn. Large numbers of natives passed, carrying baskets of apricots and peaches; the former were nearly out of season, the latter just coming in. Damsons were also appearing. Siskins, (*Chrysomitris spinus*), were breeding among the apricot-orchards around Tacheo-sze; and Goldenwings, *Chlorospiza sinica* (L.), old and young, were flitting about in small parties. On a mound by the side of a trickling stream in the woody hill-side I noticed a Wood-Wagtail, *Nemoricola indica* (Gmel.), pulling at a worm. It would not be disturbed by my approach. I had several opportunities of watching this bird, as it spends its summer among these western hills. It raises and depresses its tail slowly. It sings from the bough of a tree, moving the hinder part of its body from side to side; its song consists of a long wailing whistle-note, which it sometimes doubles. In flying it rises up and down, but utters no note with every jerk as do the true Wagtails. It is extremely tame. I did not find its nest.

On the 6th of July we visited a large cave about a mile from our temple. It is on the side of a low hill which stands alone. Its mouth is about 20 feet in diameter, opening into an abyss floored with broken rocks, among which water has collected. Its internal dimensions are large; but it offers no means of entrance. Along the

walls of its interior the rock was broken into shelves; and here the Rock-pigeon (*Columba rupestris*, Bp.) resorted in hosts to rear its young, and find a cool retreat from the noonday sun. A shout and a few stones thrown in brought them out in swarms. The Sparrow, of course, also availed itself of so satisfactory a site. A pair of Kestrels had a nest on the cliff overlooking the hole; and several species of Hawks were about. In this neighbourhood I also observed Choughs, *Fregilus graculus* (L.). Their peculiar, loud, discordant notes were quite enough to inform you of their approach.

On the 7th we got donkeys and crossed the hills, making south-eastwards to the temple Ling-shan-sze, where the British minister resided. This is a very fine temple, situated on a lower slope of the range that faces Peking, and commands a fine view of the plain with the great city in the distance, and the lower wall to the south of it enclosing the Nan-Haitsze, or "Southern-Marsh" hunting-grounds of the Emperors, celebrated among zoologists as the only known habitat of the *Elaphurus davidianus*. To the north can be traced the various parks and gardens of the Emperor's summer abode, in which are confined the *Cervus xanthopygus*, M.-Edwards, the *C. mantchuricus*, mihi, and the *Capreolus pygargus* (Pall.). To the latter Europeans can get admission; but the "Southern Marsh" is closed against them: it is of large extent, and has east and west gates, at both of which troops are quartered. Foreigners have taken these guardians by surprise, and ridden in before they could close the gates. But beyond the barracks of the household cavalry there is nothing to be seen but low woods and marshy places—in fact, a neglected expanse abandoned to the *Elaphurus*, some few *Cervus mantchuricus*, and *Antilope gutturosa*, Pall. Being informed of the interest the Society took in this animal by its indefatigable secretary, Sir Rutherford Alcock moved one of the high ministers to procure him some of the fawns alive. Four were obtained, but they were so shaken by the cart that conveyed them to the legation that one died. The mandarin sent a fifth. The minister desired me to look after them, and I had left them in the legation doing well; but the day after my arrival at Ling-shan-sze word came that another had died; and on the 9th I was on my way back in a cart to the city, which I reached after a five hours painful jolting. The young *Elaphuri* were being fed on milk and bran accompanied with fresh-cut grass; two of the three survivors were suffering from diarrhœa, and a third died. I was in despair, as the remaining two looked sickly. At last I observed how fond the two living *Capreoli* in the legation were of sprigs of the elm that abounded in the grounds, and I tried my young charges with that. They enjoyed it and began to brighten, and I had no more trouble with them. The elm-branches were given to them as daily dessert; it was the over-feeding on damp grass that was killing them. The young *Elaphuri* came into our hands when they were about six weeks old. They had a very calf-like look, and were very unsteady on their legs. Their tails were not, as in the adult, merely tasselled at the end like a Donkey's, but were covered with hair uniformly bushy throughout. Their coats were

of a deep yellowish brown or fawn-colour, spotted all over with large spots of white. As they grew older the spots began to disappear, and the hair to grow longer and browner. When I left Peking in October scarcely a trace of spots was left, and the animals were steadier on their legs, but still gawky and awkward. I congratulate the Society on having got buck and doe both safe and alive in the Gardens.

Fairs are held twice a week at different temples in the city, and are attended by large numbers of well-dressed people. The booths are neatly got up; and there is always a good display of toys, nick-nacks, and flowers; but I did not see much to attract in the bird line. A few of the Chinese pet-birds were offered for sale, and these either young or in bad plumage. Some are shown in cages, others attached by a slipstring to a stick with a metal point at its end for planting in the ground or in a flower-pot. One of their curiosities was an albino *Lanius bucephalus*.

On the 25th of July I observed that all the Swifts that were breeding in the roofs of the various buildings in the legation had cleared out their young and deserted their nest-holes. In passing the western gates of the Chinese city, of the thousands that swarmed like bees round their turrets a few weeks ago not one was to be seen on the 28th of July. In the morning and evening many still sported about at this date in the air over the legation grounds. The young leave their nests without any loitering or trying of wings; but for some time their parents feed them on the wing. The old birds are fond of screeching as they fly, especially in cloudy weather. Heavy rain closed July; and on the return of fine weather (8th of August) not a Swift was to be seen; the myriads that swarmed in the air of Peking during the fearful dry heat of July had all disappeared. This accounts for my not having met with them on my former visit to Peking in the autumn of 1860; they had left before we arrived. No House-martin (*Chelidon*) frequents the city; and I only once saw a couple passing over when out on a trip in the country. *Hirundo gutturalis*, Scop., and *H. daurica*, Pall., are the only Swallows that court the protection of the Pekinese householders, while *Cotyle riparia* (L.) enlivens their river-banks. The Swift is closely allied to our home friend *Cypselus apus*, L., but differs sufficiently to be distinguished as an Eastern race:—

CYPSELUS PEKINENSIS, sp. nov.

Back, nape, and underparts as in *C. apus*, the white on the throat more extended. Crown, rump, tail, and wings light brown with a slight coppery-pink gloss. Primary coverts, shafts of quills, and outer webs of wing-primaries blackish. Forehead very pale, with a whitish upper edge to the black patch in front of the eye.

♂. Length 7 inches; wing 7; tail 3, depth of fork 1; wing reaching beyond tail 1·2. Legs deep purplish brown, with black claws. Inside of mouth flesh-colour, with a purplish tinge, especially in lower jaw. Skin round eye and bill blackish brown tinged with purple. Iris bright brownish black. Judging by the bareness of the breast and belly, both male and female sit on the nest.

On the 9th of August I went out again to the neighbourhood of the Black-Dragon temple, and the following day started with some friends for the *Meaofungshan*, a temple built like a fortress on a hill 1500 feet high. The road lay across the valley and over the range (1300 feet) on which the Tacheo-sze temple stands, along a plateau and through an orchard-planted ravine. On the grassy parts of the hills *Emberiza cioïdes*, Brandt, occurred frequently, singing sweetly a Robin-like song; but about the orchards and plantations of oak there were few birds. The ear was everywhere deafened by the noisy Cicadas. In the ravine about the foot of the *Meaofung* hill the chief species was a brown *Cicada* about 1½ inch long, known to Europeans in Peking as "Keenlung's Nightingale." Its cry may be syllabled "Meao-meao-meao-may ——." It is said by the Chinese to have been introduced from Jehol into this neighbourhood by the Emperor Keenlung, who took great pleasure in its note. The noise it makes is perfectly bewildering, and one cannot but feel pity for the Emperor's unaccountable taste. From the small village at the foot of the hill it was a painfully fatiguing climb up the winding stone steps to the temple. This temple is considered especially sacred in the eyes of the Pekinese, and twice each year is visited by pilgrims, who make the journey, a distance of thirty-five miles from Peking, on foot, prostrating themselves at each step. There were several kinds of birds about the woods on this hill. Kestrels and *Erythropus amurensis*, Midd., were about in numbers; and in the pine-trees about the temple I watched with pleasure the movements of the little *Sitta villosa*, Verreaux, and the Crossbill. The early morning of the following day was cold, and a high wind was blowing. Choughs and Kestrels were rising and falling in the air at one another against the wind. In the wood below, the *Erythropus* was feeding its fledged young on the branch of a tree. On the rocks below the temple two Squirrels were active, chasing one another and fighting. I secured one; it was brown, with a long brown bushy tail and whitish underparts; its ears were rounded, and not plumed; and its face was more sharp and Rat-like than in ordinary Tree-squirrels. It resembles in colour the *Sciurus chinensis*, J. E. Gray, from Ningpo; but the latter is a smaller animal, with rounder head, and more arboreal in habits. The Peking Museum had several specimens of the northern species; and M. A. Milne-Edwards has lately figured it, in his 'Recherches des Mammifères' (in course of publication), as the *Sciurus davidianus*. We returned by a long circuitous route, which took us eastward through a long gully to a *cul-de-sac* among the hills, to get out of which we had to ascend the *Shipa-parh*, or "eighteen flights" of stone steps. The descent took us to the banks of the *Wênho* (river). Our course thence lay north-westwards through the valley to the Black-Dragon temple. It was a long, fatiguing walk of twenty-eight miles. On our way among the bushes on the hills we heard the *Garrulax*-like note of *Pterorhinus davidi*, mihi, and saw small parties of *Rhopophilus pekinensis* (mihi) flitting along the tops of bushes singing sweetly.

On the 13th of August we paid another visit to *Tacheo-sze* (the

Prussian temple), but beyond Crossbills and Goldenwings we saw nothing of interest. The Crossbills were usually on the tops of the pine-trees feeding on the cone-seeds, and twittering in notes much like those of a Sparrow.

LOXIA ALBIVENTRIS, sp. nov.

Small; like in colour to *L. curvirostra*, L., but differing from all the known species in having the abdomen and under tail-coverts white, the latter with large central arrow-head brown spots. Under quills whitish.

Length 6 inches; wing $3\frac{5}{8}$; tail 2; tip of wing to end of tail ·6. Iris brown; bill brown, light horn-colour along the tomia. Legs, toes, and claws blackish brown, washed with pink on the soles. Called here *Keao-tsuy* (twisted bill).

On the 14th of August, with two donkeys to carry our baggage, we walked northwards across the millet-plain twenty miles to Changpingchow, and put up at an inn near the west gate. This town contains a Taotai, who has charge of the tombs of the Ming Emperors, situated in a neighbouring valley, and called the *Shih-sán-ling* (or thirteen eminences). In the early morning we got donkeys, and rode to the celebrated tombs. Two miles of road brings you to the commencement of the sacred precincts, marked by a high open gateway of three arches, whence leads a paved way for a mile to a brick gateway, also of three arches; a mile further and you reach a single bronzed arch with a large tablet inside, raised by the Emperor Keenlung of the present dynasty, who repaired the tombs; then a series of animals in stone flank the way on either side, one kneeling and one standing, of the following in order—the fabulous *Kelin*, Lion, Camel, Elephant, *Tsowshow* (Lion with scales and hoofs), and Horse, succeeded by two warriors and two statesmen. Three triple arches are next passed, and you have a cultivated plain before you bounded by hills, at the feet of which you can count, as you gaze round, thirteen enclosures of various extent, with what looks like a painted temple with yellow tiling in each, surrounded by trees. A stream crosses the plain; and the ruins of a marble bridge show the course of the road from the arches. The tomb of the Emperor *Yunglo* was the largest and best wooded; so we bent our steps along the broken stone causeway to that. The porter in charge was called and let us in. We were led into the hall where the shrine was placed,—an enormous room 70 paces long by 33 broad, and about 60 feet high in the centre, the sides a little lower; the ceiling was chequered and painted, a good deal like that of the Elgin Gallery in the British Museum, and supported by huge pillars of single timber, each 12 feet in circumference, throughout its great length. There were eight of these pillars. In rear of this large hall is the great mound in which Majesty's bones are entombed. After all this the Society will expect to hear something of the ornithology of the place; but birds were scarce. Tits (*Parus minor*, Temm. et Schleg.) and *P. kamtschaticus* were commonest; but I looked in vain for the Crested Cole-tit (*P.*

pekinensis, David). *Sitta villosa*, Verr., occurred (itself almost a Tit in habits) running along the slender twigs of the trees and hanging about the leaves, fighting and pursuing one another, and at times giving utterance to a lively chatter a good deal like that of *Lanius lucionensis*, Strickl. I was enabled to get several specimens. The males differ from the females in having a black cap. It has a very close ally in *Sitta canadensis*, L., of North America. A pair of *Ruticilla aurorea* (Pall.) had hatched a brood of young in the grounds, and were feeding their spotted fledglings on the stone parapet. The sun was setting, and we were leaving the place annoyed at our bad luck, when an Owl popped out of its roost in the bosom of a tree. I winged it; and after a hunt we secured a fine specimen of a Wood-owl, which seems to be the Himalayan race *Syrnium nivicolum*, Hodgs.—♀. Length 16·5 inches; tail 7·25; wing 11·75; wing-tip to end of tail 1·75. Irides black. Skin round eye yellowish flesh-colour. Bill wax-yellow with tinge of green. Soles of feet yellow; exposed part of toes greenish yellow, as also are the bases of the claws, rest of claws blackish brown.

The distance from Changpingchow to the tombs is about nine miles.

On the 19th I crossed the hills and paid another visit to H.M. Minister at Lingshansze temple. Several temples stand on higher positions up the hill-side, and many of them were occupied—one by the American legation, another by the Chaplain to the British legation, and others by the secretaries and students also of our legation. These were all attainable by stone steps winding through the ravines and over the hill-sides. The ravines were well planted with trees, of which the chestnut-leafed oak was most in abundance; its acorns support the Pigs, and the acorn-cups yield a black dye. The *Kœlreuteria flata*, Bunge, with its popping pods, was also plentiful, and the *Sophora japonica* or locust-tree. This last is the commonest tree in the city of Peking, and is sadly infested with a green Measure-worm, which developes into a brownish-mottled moth. The tree bursts into leaf in spring, and in a few weeks stands denuded, every leaf having been eaten by this caterpillar. It shoots again into leaf, and is again stripped. Three efforts are made by the tree in the year, and three times it is robbed of its leaf; and yet the tree is abundant and does not perish. In Boston, U.S., a similar worm is said to make great havoc among the locust-trees of that city; and to put a stop to it the citizens imported the Sparrow (*Passer domesticus*, L.); but *Passer montanus*, L., abounds in Peking; yet the Measure-worm multiplies in spite of it. A scented *Artemisia* spreads everywhere on these hills, scattering a dust-like yellow pollen. A sprig of this is placed in the headgear between the ears of Mules and Donkeys to keep off the blood-sucking flies that swarm on the backs of the ears of the poor beasts. The plant is twisted by the country people into ropes, which are burned to ward off mosquitoes. In this neighbourhood the commonest *Cicada* that deafens you is the green one of the south, about an inch and a quarter long. It keeps on crying "Kwai-kwai," &c., for some time, and then finishes with a prolonged "sze." A second is a large dark-brown species called

"Knife-grinder," also of the south, which sustains one note throughout, sounding like the grinding of a knife on a wheel. A third is smaller, also dark-coloured, with yellow lines on its face, and utters a single bell-like sound, heard often at night as well as in the day. All these three visit the city.

It may be that the presence of so many Europeans with guns had driven the birds away; but in the hill-side woods insects seemed to hold complete sway. In the early morning there were some signs of feathered life, and a few songs were to be heard; in the noonday no life stirred, you felt choked with heat and deafened with *Cicadas*; but the evening came on fast, the Hawk and Crow tribes were active, Chukar Partridges might be heard chuckling in the grassy hills above; and as darkness stole on the Goatsucker would start into life, with its continued "chuck-chuck" note, and commence pirouetting over the trees. I shot one of them on the 31st of August: it was moulting its quills; but I found it to be *Caprimulgus jotaka*, T. et S., as I had suspected. Its remarkable note, uttered at nightfall and the night through, attracts the notice of every visitor to the hills, and they generally attribute it to an Owl. The Chinese give no help in explaining what the bird is, as they call it the *Teay-shoo-pe*, or "Bark of the Iron-tree," from its bark-like appearance, I presume, when it lies along a branch at roost during the day. By the end of the first week of September the Goatsuckers had all disappeared.

On the 1st of September we went out to look after Partridges. We kept along the plains, and did not see a bird. A Quail or two was all we saw in the game line. The trees were full of *Phyllopneuste sylviculirix*, mihi, and *P. plumbeitarsus*, mihi; and some *Reguloides superciliosus* (Gmel.) were about. A species of Scorpion was common under stones, attaining a length of 2 inches. It frequently finds its way into houses; and its sting is poisonous. I was told on good authority that if surrounded by a fire this Scorpion turns its tail up and stings itself in the head, causing death. I was not inquiring enough to try the experiment.

I will here insert the few notes I made on specimens procured in the hills.

Tchitrea incei, Gould, ♂. Length 9·25; wing 3·6; tail 5·4, central feathers ·6 longer than the others; wing-tip from end of tail 1·1. Bill, legs, and eyelid fine cobalt blue. Inside of mouth greenish yellow. Testis very large. Skull large, with difficulty drawn through the neck. This bird was shot at the end of May, and, from the state of its nasal organs, was prepared to breed; and yet the long feathers of its tail were not developed as in autumn. On the 7th of September I got a full-plumaged bird of the year. It had the brown bill and feet and light plumage analogous to *Tchitrea principalis* in the same stage. The cry of the adult bird is loud and chattering, similar to many of the notes of *Cyanopica cyana* (Pall.).

Caccabis chukar, Gray, ♂. Length 12·25 inches; wing 5·75; tail 3·3, of 12 graduated feathers rounding into a semicircle when ex-

panded; tip of wing to end of tail 3·1. Bill and skin round eye pink or coral-red; iris red sienna; legs lighter pink red, with pale soles and brown claws. This bird was shot on the 5th September. A party of them were feeding in a millet-field at the foot of the hills. They, on alarm, at once took to the hills, dispersing among the rocks, and calling to one another. Their note is a chuckle, "kok-kok-kok," the syllable constantly repeated. When pursued they at once run up the hills; and if the hunter wants sport, he must get above his birds, when they can be made to take wing. It is a great scramble to catch a wounded bird. The Pekinese call them *shih-ke-tsze*, or "Rock-fowl."

Picus poliopsis, Swinh., ♀. Iris bright chestnut-red. Bill blackish brown, asparagus-green at base, with which colour the whole of the bill is washed. Legs greenish brown, ashy yellow on soles; claws brown, with pale bases. This species appears to be rare about Peking. I only saw one other specimen of it during my stay. It is a second species of the subgenus *Hyopicus*, of which *P. hypery-thrus* is the type. It differs from its Indian ally in having its under-parts yellowish brown instead of chestnut, the cheeks and sides of neck being snuff-coloured. The crimson of its rump mounts to the belly. It is rather larger in size, and is more banded with white on the back and scapulars. The white spots on the head of the female are much larger. I considered it a variety before; I think now, on seeing a third example, that it is well entitled to specific rank.

Hemichelidon sibirica (Gmel.), bird of the year. Breast and flanks confusedly streaked and spotted with deep greyish-brown. Upperparts spotted with pale ochreous, lesser wing-coverts tipped with the same. Two adult specimens from Siberia of this species, kindly sent me by Dr. v. Schrenck of St. Petersburg, are paler than Chinese examples, but otherwise similar.

I will take the opportunity of here introducing two species from North China in my collection, which appear to be new.

ARUNDINAX FLEMINGI, sp. n.

The small species of reed-bird that Mr. Fleming, R.A., brought from Tientsin in 1861 seemed to answer to the description of *Salicaria cantillans* of the 'Fauna Japonica;' and I included it in my China list under that name. I have now the Japanese species before me, and find the two birds quite distinct. The wing of our bird shows a different proportion of quills; the tarsi and hind toe are much shorter, and the hind claw and toes much weaker. It is smaller in every way, and differs in its coloration.

Upper parts light brownish olive, eyebrow and cheeks pale ochreous, lore creamy white, with an obscure brown streak between it and the eyebrow; throat and middle of belly white. Underparts primrose-yellow, tinged with buff, strongly on the vent. Quills and tail light hair-brown, margined with light brownish olive. Bill brown on the upper mandible, except its tomia, which, with the lower mandible, are ochreous yellow. Irides blackish brown. Legs and toes ochreous flesh-colour.

Length about 4·5 inches; beak in front ·35, from rictus ·52, depth at base ·13, breadth at base ·15; tarse ·83; middle toe ·55, its claw ·18; hind toe ·35, its claw ·22; wing 2·35, fourth and fifth quills equal, sixth a trifle shorter, first 1·1 shorter, second ·35, third ·6; tail 2·1, of twelve feathers, the penultimate ·5 shorter than the eight centrals, which are equal, outer rectrix in the specimen not full-grown.

I have also an *Emberiza* that Mr. Fleming brought from Tientsin, which I registered before as *E. stracheyi*, Moore, but wrongly. I have since procured a specimen from the country near Amoy, shot in December 1867, which has rather a larger bill; and I have a bird from Père David, taken at Peking on the 12th May 1867, with a shorter and rather smaller bill. They are all three males. The Tientsin and Peking birds are in summer plumage, and have the whole head and throat black, with a broad line of white down the centre of the crown, a broad white eyebrow, and a broad white moustache; on the under neck, below the black throat, a large white spot occurs; and again below this comes the rufous pectoral band. The Amoy bird was shot in winter, but still shows much black on the throat. I suggest for the species the name

EMBERIZA TRISTRAMI, sp. nov.

Crown black, dividing at the occiput, and running in a broad line down each side of nape; at the division on the occiput a large white spot occurs; and a little olive tips the central crown-feathers, suggesting a central streak, in immature plumage. Eyebrow and long moustache-streak white, with a splash of yellowish olive, which marks also the lores. Lores, under the eye, and ear-coverts brownish olive, a black line running from the hind corner of the eye round the ear-coverts. Throat yellowish brown, more or less marked with black. Upper parts light yellowish brown, with an olive tinge; the black nape-lines change into deep rust-colour and continue to the centre of the back; scapulars and lower back with broad centres to feathers black, flanked with rust-colour. Rump and upper tail-coverts bright rust-colour; the two central rectrices brownish ferruginous; the fifth and fourth brown, rust-coloured on the outer web with light yellowish-brown edging; the third of somewhat lighter brown, with a small white spot on the inner web near the tip, which is also white; the second, with half the inner web white, running from half an inch from the base along the shaft to the tip; first or outermost feather white, except a brown mark along the outer web encroaching on the inner towards the tip; all the unmentioned parts of the last rectrices are brown. Wing-coverts blackish brown, the lesser broadly margined with light olive-brown, light ochreous at their tips; the greater edged broadly with brownish ochre, those covering the tertiaries being rust-colour, with black median mark; winglet deep brown, with rusty edges; primaries hair-brown, the first quill edged with white, the next few with pale yellowish brown, gradually assuming a rust-colour towards the innermost

quills; tertiaries blackish brown, broadly margined with rust-colour, which increases inwards until it predominates over the brown.

Underparts.—A white spot succeeds the dark throat. Breast and flanks rusty buff, with darker median streaks of the same on the former, and blackish streaks on the latter. Belly, vent, and axillaries pure white.

Bill somewhat finch-like, brown on upper mandible and on apical third of lower; basal portion of latter flesh-colour.

Legs, feet, and claws yellowish flesh-colour; the last curved and sharp.

Length about 5·5; wing 2·9, the four first quills nearly equal in length; tail 2·85, composed of twelve rectrices narrowing towards their tips; bill in front ·4, depth at base ·23; tarse ·7, hind toe ·3, its claw ·27.

The description is taken from the male procured near Amoy.

We left Peking on the 17th September by the Tihshing gate, and, passing the towns of Tsingho and Shaho, put up for the night at Changping Chow, twenty-five miles from town. Before reaching our resting-place, we strolled under some willows, saw two Orioles (*Oriolus chinensis*), and secured a female *Turdus pallidus*, Gmel.

On Sept. 18th sent our carts on to Shihshanling (Ming tombs), and walked along the hills at the back of Changping Chow, that overlook the valley of sepulchres. Saw a flock of Chukar Partridges jumping up the rocks, and put up two Bush-quails, *Turnix maculosa*, Temm., in the valley among the beans. Wheat was being sown, sorghum and other millet being gathered; buck-wheat was in the ear; and the small beans planted between the rows of sorghum were ripening. Large numbers of Kestrels were flying and hovering about. Their movements struck me as peculiar; and on shooting a male we found the species to be a race of *Falco cenchris*, Naumann. We procured on this occasion an adult male, and in the Western Hills a young male. They agree in size and form with *F. cenchris* of Europe; but the adult male has all the wing-coverts grey right up to the scapulars, most of them narrowly edged with rufous. The adult has the inner or short primaries broadly bordered at their tips with whitish, rufous in the immature, and wanting in the European bird. Both adult and immature have the white on the under quills 3¼ inches short of their tips; in the European bird it advances one inch nearer the tips. I will note this Eastern race as var. *pekinensis*. It will probably be the bird that winters in India.

Among the trees of Yunglo's tomb I was attracted by a loud shaking cry I had never heard before; and while wondering what it could be, I saw a bird like an attenuated Jackdaw fly across and fix on the trunk of a tree. *Picus martius*, of course! My heart throbbed violently; but it was no easy matter to bring him down, the shot had such little effect on him. One of my comrades helped me in the pursuit; and we at last secured the noble fellow: iris reddish white. I loitered about till dusk; and when nearly dark, something flapped violently across the avenue. Crossing under

the trees, I could just distinguish the outline of a large smooth-headed owl on a bare branch against the sky. I bowled him over, and found him to be a *Syrnium nivicolum*, Hodgs., again—the species I had got here on my former visit. The other birds procured were a Green Woodpecker (*Picus canus*), a Pied Woodpecker (*Picus mandarinus*), a Titlark (*Anthus agilis*), which was common about the trees, and a couple of Nuthatches (*Sitta villosa*, Verr.).

The night of the 19th we passed in a one-roomed cottage, dignified by the name of inn, near Yunglo's tomb. It was like the stall of the old cobbler, "which served him for kitchen, for parlour, for all." I will say nothing of the horrors of the night, or of our personal appearance in the morning. What I lamented was the blackened state of my specimens from the constant fumigation they were subjected to. On rising we were saluted by the notes of a *Picus scintilliceps*, mihi, from a neighbouring tree. We had heard talk of a forest existing over the mountains, and we got a guide to lead us to it. Unfortunately the term for forest in Chinese means any thing from a clump of trees to a large expanse of wood; so that after clambering about the rocks and wading to our necks in damp grass for some hours, our guide brought us to a standstill at a group of firs, and told us that was the largest forest on these hills. We retraced our steps in disgust, but not till we had renewed our acquaintance with *Rhopophilus pekinensis* (mihi). It was whisking about its long tail on the tops of bushes, uttering a loud whistle. Its eyelid was madder-red, its iris washed with yellow; upper mandible light brown, lower yellowish white; legs brownish flesh-colour tinged with yellow.

From the Ming tombs to the town of Nankow, at the gate of the mountain-pass which leads through the inner portion of the Great Wall, there was a good road for the first six miles; the remaining six were fearfully stony and rocky, and the jolting of the cart endangered one's bones. A gentleman from California put up at our inn, and we spent an instructive evening together.

From Nankow, the gate that opens into the pass, to Shato, beyond the gate at the top of the pass, is fifteen miles; but the road is blocked with stones and lumps of rock, and our carts had to be unpacked and helped through with extra animals and men, while our goods were transported on donkeys. My two companions and I walked and rode on horseback. A male Sparrow-hawk (*Accipiter nisus*), with clear yellow irides and long yellow toes, was all we bagged; but we were delighted by witnessing the stoop of an Eagle. He was flying slowly across at a height over the deep gully through which we were travelling, when suddenly, like a stone, down he came and, shooting obliquely, struck a bank within fifty yards of us behind a cottage. He seized a Leveret; but the little creature slipped away from him, and escaped to the ditch below. We were so struck by the sight that we did not think of seizing our guns till the bird was out of reach. The wild rocky hills of the gorge draw closer as we approach the upper wall, that crosses the pass. Another flock

of Partridges attracted my comrades; and I sat down to gaze upon the treeless scene. Something moved to the right, and in an instant a little Squirrel stood on a rock before me, stroking its whiskers with its paws, and glancing at me. In another second, and it was scampering to another rock. I saw several of them, and found it common enough on our return through this pass. It is a ground-species, and seems identical with *Tamias striatus* (Pall.), which occurs also in Amoorland. The Great Wall at the upper gate of the pass is about 25 feet high by 16 broad, with turrets along it at a distance of every 120 yards; it stretches away along the ridges of the hills, to the right and left, out of sight. The wall of the enclosure at the gate was in ruins and deserted, and the pavement under the gate broken up. Two miles more of broken road brought us to the almost deserted walled town of Shato, consisting chiefly of bad inns. We went through it, and put up at an inn of a better class in the suburbs beyond. The country about was desolate-looking, composed of sand and gravel, in which some travellers have found marine shell. Growing out of the side of a cliff was a bushy tree, in which a pair of Choughs had made their roost. They were too shy for us; but later on our march we got several specimens, and found the species to be the European *Fregilus graculus*, L. (iris liver brown), called by the Pekinese *Hung-tsuy Yatsze* (Red-billed Crow).

In the afternoon of the 21st we reached Hwailai Hien, the hills having receded, and the country become more open and better cultivated. A small river runs to the south past this city, and is spanned by what was once a fine bridge of seven arches, leading to a gate in the city-wall. We dismounted, and walked along the river. We saw a Heron (*Ardea cinerea*), some Snipe, Golden Plover, and a large flock of Rooks (*Corvus pastinator*, Gould). Passing a mud-walled city, we continued, along a bad, stony road, to Shaching (or the Three Cities), where the inns were many and excellent. On the way we passed dilapidated towns and the ruins of limekilns, among which pigeons were breeding in very large numbers in a feral state. We shot several, and found that the reversion was not to the plumage of the Rock-pigeon of the country, *Columba rupestris* (Bp.) with a white bar to its tail, or to the ashy-rumped bird of India, *C. intermedia*, Strickland, but to the pure "Rock" of Europe, *C. livia* (L.). It must be from Europe, then, that the Chinese derived their breed of Pigeons. Iris light yellowish-chestnut. From our last roost to Shaching was reckoned seventeen miles.

On leaving Shaching (22nd September) we made for the N.W. corner of the hills on our right; to the left was a cultivated plain, with the Wenho (river) winding southwards through it, and barren-looking hills beyond. To the north of the walled town of Keming Yih a hill rises about 2000 feet, with a temple on its top. These hills are very bare of vegetation, covered with broken rock, and yield coal. Notwithstanding their sterility, the Chukar Partridge found them a pleasant retreat, and we were constantly breaking from the line of march to follow the chuckling that burst close above us. Flocks of

Swallows, *H. gutturalis* and *H. daurica*, were constantly seen; but passing the Keming Hill another species appeared on the scene. I detected it at once to be the *Cotyle rupestris* (Scop.). Its larger size, greater breadth of wing, and broader rump distinguished it, while flying, from the *C. riparia*. It occurred in small parties, perching and playing about the rocks. We saw them several times during this expedition. Iris liver-brown; wing extending half an inch beyond tail. Along the base of this hill-range the road reaches a gorge made by the hills on the left advancing, with the river racing through between over rocks and shallows. Emerging from the gorge, a large hilly patch of sand occurred, sparsely sprinkled with coarse grass. It was riddled with holes; and little rat-like creatures were standing on hind legs, or popping their heads out of the holes, or gambolling after one another, just as I have since seen the prairie-dogs do on my railway transit across the continent of America. A shot fired among them, and all disappear like magic. They move fast, but awkwardly, somewhat like Guinea-pigs. Their burrows twist and turn in the descent, so that one cannot reach down with a stick. One came skeltering along, squeaking, with another in pursuit, on to a grass patch. I secured it. Its irides were brown. It appears to be the animal that M. Milne-Edwards has figured in his outcoming 'Recherches des Mammifères' as *Spermolegus mongolicus*, and that from Amoorland, figured in Middendorff's 'Sibirische Reise' as *Arctomys* (*Sperm.*) *eversmanni* (Brandt). My specimen is light brown above, cream-colour below and along the sides. The tail is short, the first half inch of its length with short reddish hair, the rest with lengthened hair expanding into a spatula-shape, rufescent at its roots, a broad black ring on its centre, with broad creamy tips. Both Middendorff and Milne-Edwards in their figures convey a good idea of its appearance. A young specimen that I have from Peking has the upper parts much darker and ruddier, and the underparts buff-coloured; tail rufous, with short hair throughout. M. Gill, the amateur naturalist attached to the French camp, procured this animal in 1860 near Peking.

Over some tough stony hills we reach Heangshuypoo, twenty-three miles from our morning's start; and as there was still daylight, we pushed on over worn roads until, benighted, we were obliged to put up in a filthy cattle-stall at the dirty village of Neho-tsze, six miles further on. Dozens of carters and country roughs cooked, ate, smoked, and talked all night in our cabin, while a storm made the darkness horrible outside. We managed to pig it somehow, and survived the night.

Next morning (September 23) we trailed through the mud for the remaining five miles, and put up in an inn in the suburb outside the wall of Seuenhwafoo, the capital of this prefecture. It rained all day, and was cold and wretched. At this city the Roman Catholics have a prosperous mission, with European priests resident; and it was here that Père David got a great many of his good things. The streets were under water; so we had much difficulty in wading through the town. In one of its thoroughfares some live birds were offered

for sale; the best were *Garrulus brandti*, *Eophona personata*, *Leucodiopterum sinense*, and *Acridotheres philippensis* (the last two from the south).

We travelled, on the 24th of September, the remaining twenty miles and reached Kalgan, or Changchiakow. Near this town the road again became stony, and the hills closed round to form the long pass which gradually ascends for thirty miles, until it places you on the boundless grassy plain of Mongolia. We passed many parties of Mongols with strings of camels, and driving troops of ponies, and several of their encampments. Crossing the Tungkeao (bridge) which spans the stream that runs down from the pass, we put up at a Mahommedan inn outside the city-wall.

On the 25th our Mahommedan host took us for a walk to show us the lions. Lower Kalgan, or Hiapoo, is the walled city of Wantseuen Hien. The road leads past this town to Upper Kalgan, or Shangpoo, about three quarters of a mile distant, at the end of which, in a short gorge, is the gate of the famous or old Great Wall. Up the hill on either side runs the wall, or rather its ruined remains—in many places little more than a line of rubble; but up the mountain and down into the valley, as far as the sight can strain, it holds its serpentine course. The wall of the Nankow Pass supplements this, enclosing the prefecture of Seuenhwafoo, which belongs to the Chili province, but is still often called Mongolia. Our host told the guard of the gate who we were, and took us outside of China. Beyond the gate the pass was divided into two by a lower hill-range, with roads on each side which united further upwards. The roads were broken and rough in places, made of slabs of stone which had got displaced; and the hills were barren and had a scorched look like those of Aden. We were not tempted to continue our journey in jolting carts, and preferred spending our few extra days of leave in returning leisurely by the way we had come. Rooks, Magpies, and Kites were common about Kalgan, and *Reguloides superciliosus* and the Pied Woodpecker were the most frequent birds in the trees about the gardens in her suburbs. One of the latter I fired at died clinging to the top bough of a tree, and there was no getting it down.

We spent the morning of the 27th of September strolling about the neighbourhood of Keming. In the fields towards the river Rooks and Jackdaws were feeding; all the Rooks appeared to have feathered chins. Among the willows we found the Barbary Dove (*Turtur risorius*, L.). We frequently came across this species in this prefecture of Seuenhwafoo between the two walls, as also *Turtur gelastes* (Temm.). In the neighbourhood of Peking the latter occurred, but not the former; and, indeed, I have never seen the Barbary Dove in any other part of China. It is a tame, gentle bird, and easily approached. I procured both full-plumaged young without the neck-ring and adult birds. Its eyelid is pale yellow, iris chestnut-red; bill brownish black; legs madder-pink, with black claws. *Turtur gelastes* has the eyelid deep madder-pink, iris golden-sienna; bill brownish madder, browner on apical half; legs purplish madder, with black claws. Some little birds among the willows were uttering

a plaintive "teo" note. I shot one, and found it to be the *Reguloides proregulus* (Pall.). I also shot a *Phylloscopus fuscatus* (Blyth) creeping tamely about the grass. Pied Woodpeckers were common; and we got several. Snow lay on the distant peaks to the north-west. We made for the temple-crowned mountain. As we approached the road under it a flock of Chukars (*Caccabis chukar*) flew up from the corner of the stubble and took to the hill. We pursued, and had some good sport. The Chinese rightly enough name this the *Shihke-tsze*, or "Rock-fowl." Well up the hill-side a party of red-tailed birds were disporting, flying from rock to rock with loud notes. One was shot, and turned out to be a new form of *Accentor*, allied to *A. alpinus*, L. I exhibited it to this Society on the 24th of February, 1870, and proposed to name it *Accentor erythropygius**. We saw a few of them later in the Nankow Pass. On this hill we came upon another interesting bird; it was a Sparrow-like species of *Carpodacus*, of a sandy-grey colour tinted with rose. There were two together, of similar colour and form. We secured the male: iris black; bill light brownish horn-colour; legs liver-brown, ochreous on soles, with deep-brown claws.

The museum at Paris has received specimens of this species from Père David; but it has been there confounded with the *C. obsoletus* (Licht.), a species with a largish black bill (*cf.* Nouv. Arch. du Muséum, t. iii. p. 31). I find its nearest ally to be the *C. githagineus* (Licht.) of N.E. Africa, from which, however, it can at once be distinguished by its smaller bill. I will name it

CARPODACUS MONGOLICUS, sp. nov.

Male. Upper parts sandy grey, browner on the crown and back; feathers of the crown, back, and scapulars with brown centres; wing-feathers blackish brown, greater coverts broadly margined with rose-colour, the primary quills more narrowly, and tipped with creamy white, the brown of each feather paling near the white; secondaries broadly margined with cream and tipped similar to the primaries; tail deep brown, whitish on edges of inner webs and broadly edged on outer with cream-colour; sides of neck, throat, breast, and flanks light sandy brown; rest of underparts cream-white. Rose tinges the sides of the head, forehead, throat, cheeks, breast, flanks, and rump, brightest on the last.

Length about 5·3 inches; wing 3·63; first quill ·05, the longest; tail 2·3, forked; centrals ·3, shorter than outermost; upper tail-coverts extend to ·65 from the tip of the tail; bill ·34 in length, ·2 in breadth, ·29 in depth; tarse ·66; middle toe ·52, its claw ·24; hind toe 28, its claw ·26.

Near Shato, on the 28th, a small Owl showed itself on the top of a ruined brick-kiln, with wings expanded, basking in the sun. It was easily bagged. On our way out I had also seen one exposing itself on a ruin during the day. It turns out to be a new form of *Athene*, most nearly allied to *A. glaux* (Sav.) of S. Europe, in its pale colour, but differs from that as well as from *A. noctua* (L.) of N. Europe, and

* See *antea*, p. 124, Pl. IX.

A. bactriana (Blyth) of Thibet, by its short tarse covered with long down, and by its well-clothed toes. I propose to distinguish it as the

ATHENE PLUMIPES, sp. nov.

Throat white, the white extending in crescent-form up each cheek in rear of ear-coverts (the lower white neck-ring of *A. noctua* is wanting); lores, round eye, and middle of belly also pure white; upper parts light reddish brown, with drops of reddish white on the head, and marked and spotted much as in *A. noctua*; underparts, leg-, and feet-feathers cream-colour, on the breast and flanks broadly streaked with reddish brown, like *A. glaux* (*A. noctua* being spotted with white on a dark ground and wanting the white on the centre of the belly); bill yellow tinged with green; irides light yellow; claws blackish brown.

Length about 8·5 inches; wing 6·2, of similar-proportioned quills to those of *A. noctua*; tail 3·6, of twelve equal feathers; tarse to base of hind toe ·85, densely clothed with down-like feathers, ·65 long; feet covered with shorter hair-like feathers, just showing scales at end of toes; soles bare and yellow.

Towards evening, as we drew near to Shato, very large flights of *Erythropus amurensis* (Radd.) and *Falco cenchris* (Naun.) appeared in the skies overhead, flying high to and fro and round like Swallows about the temples in the western hills; they were also to be seen at this season in large numbers preparatory to their migration. They must, however, wind away south-westwards, as they do not appear on the southern coast of China.

In the Nankow Pass we saw Eagles again, a small number of *Urocissa sinensis* (L.), and a single *Eophona personata* (T. & S.). One of my comrades shot the last, and had a piece of his finger nearly bitten out by the formidable mandibles of the bird. I noticed that the Crows here pursue and torment the Eagles just as fearlessly as they do the Kites in Southern China.

On the 30th of September we reached Peking just before the shutting of the gates.

In the last visit I paid to the museum I found a native with a live Nutcracker for sale. I engaged this man to collect for me, and through him got some very good things. He had worked for Père David. It was a pity that I had not got hold of him before, as now my time was getting short. He brought me three Nutcrackers, all females, of the European *Nucifraga caryocatactes* (Pall.), called by the Chinese the *Tsung hwa'rh*, or "Onion-flower." Irides dark, liver-brown, the same colour as the crown of their heads; bill, legs, and claws blackish brown.

Hawfinch, *Coccothraustes vulgaris*, ♀: iris light yellowish brown tinged with grey. *Zosterops erythopleura*, mihi: the female has less red on the flank than the male; bill light bluish grey, marked with black on upper mandible; legs deeper bluish grey.

Accipitor palumbarius, ♂. Bill brownish black, bluish grey at base; cere king's yellow marked with blackish brown, rictus king's yellow; inside of mouth light purplish blue marked with black; eyelids

black, iris fine clear yellow; legs and toes clear yellow, with black claws.

Left Peking on the 7th of October, and reached Chefoo by steamer on the 12th, where I spent a day or two. While out for a walk, put up a *Chefoo* Hare. This Hare is sent by the European residents at Chefoo to their friends in the south, and is a great treat when compared with the small species *Lepus sinensis* (Gray), which is the ordinary Chinese animal. It is, when cooked, as fully flavoured as the English Hare, and in general appearance greatly resembles it, but is smaller and varies in the colour of its fur from the brightness of *Lepus timidus* (L.) to a ruddy cream-colour. I have several specimens of its skin and skull, and I cannot distinguish it from *Lepus tolai*, Pall. Père David procured it in the neighbourhood of Peking, where I found the smaller and harsher-haired *L. sinensis* the prevailing species; and he also reports it common in Mongolia. My brightest specimen (♀) has the head pale rufous-brown, deeper on the forehead and crown, and somewhat yellower on the outer surface of the ears, all mottled with black, the black appearing in an irregular streak or two on the cheeks; the upper lips, chin, throat, and circle round the eye produced backwards in the form of a half eye-brow, are creamy white; moustache-bristles white, some of them brown near their bases; inner surface of ear rufous cream-colour; back of ear pale fawn-colour, with a broad brownish-black tip; on the hind neck behind the ears an unmottled light rufous patch occurs; back yellowish rufous, with most of the hairs broadly tipped with black; these hairs are dark brown towards their bases, with thick brownish-white down; rump and sides of thighs unmottled creamy rufous; tail black on upper surface; beneath white, as are all the underparts to the fore legs. Under neck, chest, sides of body and legs yellowish rufous, the fore legs with a creamy patch above the paws, and the inner surface of hind legs and feet creamy white. Long hairs are scattered over the upper parts.

	in.
Length from muzzle to root of tail	19
——— of tail (including ·75 of tip-hair)	3
——— of head	4
——— of ear	3·80
——— of fore leg from shoulder	6·75
——— of hind leg from hip	9
——— of skull	3·54
Width of skull (arch to arch)	1·63
——— between orbits	1·1
Length of nasal bones	1·53
Width of ditto behind	·81
——— of ditto in front	·53
Length of incisive opening	·88
Width of ditto behind	·43
Length of the six upper molar teeth together	·65

A second specimen (♂) is lighter and more cream-coloured, with

the light-rufous hairs of the upper parts the same colour throughout, and only occasionally tipped with black. The ear at the back has only an apical margin of black; and the animal answers to Waterhouse's description of *L. tolai* (Mammalia, vol. ii. p. 48).

A third (♀) is paler, duller, and more dingy throughout than the last, with very little rufous, and its back is more mottled with black; but its apical ear-patch is as conspicuous as in the first. All three are from the same locality, and it cannot be doubted are of the same species; yet they vary so much in coloration. Their skulls, moreover, are of nearly similar form.

I have only fallen across two other mammals (not to speak of Bats) in North China not alluded to in this paper; and these are a Hedgehog and a Mole, which I procured when with the troops at Peking in 1860. I sent a specimen of each to this Society, and they were presented to the British Museum. Dr. Gray pointed out that the Mole was a new species. but did not assign it a name (P. Z. S. 1861, p. 390). Some years after, the Abbé David sent the Mole to Paris, and M. A. Milne-Edwards has described it as *Scaptochirus moschatus*. The Hedgehog Dr. Gray considered to be *Erinaceus collaris* (Gray) of South India; but it seems to me to be distinct from any thing yet described.

Erinaceus dealbatus, sp. n. from Peking. About the size of *E. europæus*, its nearest ally; much paler; spines shorter and thinner, and all setting backwards, pale brown, whitish at bases and tips; ears shorter, narrower, and more hidden; hair of underparts shorter, of a whitey-brown colour, with rufescent down at roots; face whitey brown, with brown ears (no black on the muzzle and round eyes as in *E. europæus*); feet small, pale brownish (and not black), with horn-coloured short claws.

The skull, which is that of an adult, shows a shorter muzzle; the molars in both jaws are comparatively smaller; the fronto-parietal suture occurs much further back; the frontal bones are longer and flatter, and the orbital prominence further back; the molar slopes gradually backwards, making a much less angle at its junction with the temporal. The skull is too injured to enable me to give measurements; but enough remains to show that it is distinct from that of *E. europæus*, with three of which I have compared it.

We left Chefoo by steamer on the night of the 17th October. The 18th was calm and fine; and the following birds appeared about the ship:—1 *Asio brachyotus*, 1 Skylark, 2 *Emberizæ personatæ*, 1 *Calliope*, 1 *Ianthia cyanura*, 1 *Ruticilla aurorea*, 1 *Coccothraustes vulgaris*, 1 *Butalis cinereo-alba*, 1 Pied Wagtail, and a Thrush. The last, while following the vessel, fell exhausted into the sea. Four male Gold-crests came into the ship, and were so tame that they were easily caught. Bill deep blackish brown; legs yellowish brown, with much lighter toes. In the older birds the shanks are deeper-coloured, and the toes light orange-brown with an orange-yellow wash on soles, the plumage brightens, and the yellowish green on the back mounts higher up. We were within 100 miles of the Shantung coast, which was our nearest land; and it is reasonable to

suppose that the birds wandered to us from there. I have never heard of the Gold-crest occurring in China; but this will be sufficient authority to enable us to enrol it on our list. The species is very close to the European *Regulus cristatus*; but Bonaparte separates it as *R. japonicus*. It has purer white on the lores and round the eye, and the hind neck is strongly tinged with grey.

On the 20th October we landed at Shanghai, and so finished our cruise to Peking and our glimpse at the Northern fauna.

9. On the Saiga Antelope, *Saiga tartarica* (Pall.). By James Murie, M.D., F.L.S., F.G.S., &c., late Prosector to the Society.

In the twelfth fasciculus of the 'Spicilegia Zoologica' of P. S. Pallas (published at Berlin in 1777—that is, nearly a hundred years ago) will be found not only an erudite historical and descriptive account of the *Antilope saiga*, considered in its external bearings, but also a very accurate *résumé* of all the anatomical structures of value as regards classification. The author likewise has figured the skull, stomach, and gall-bladder.

Pallas's observations, to my mind, contain the kernel of all that is useful for zoological purposes*. As, however, there still remain points that seem worthy of investigation, I proceed forthwith to tender, as a communication, notes upon two specimens which have come under my inspection.

I may crave indulgence, under these circumstances, as, if some of the data I bring forward are not entirely new, they are doubtless not generally known. A benefit towards science may result from recognizing the correctness of Pallas's statements; whilst a fresh investigation, entering more into detail in some structures, at least admits of a reconsideration of the animal's affinities.

For the latter reason, and because a fuller description of this recent but ancient-like type of mammal may serve as a basis of future comparison to palæontologists as well as zoologists, I have written a lengthy account of the skeleton, which the naturalist above referred to briefly sketches rather than describes. The skull, in particular, offers several points of departure from the Antilopidæ, among which the Saiga is classed; and thus the taxonomic bearings of such aberrance is a factor of some importance.

I. The Skeleton.

1. *Spine and adventitious Bones.*

(A) *Vertebræ.*—The spinal column consists of 7 cervical, 13 dorsal, 6 lumbar, 4 united sacral, and 12 caudal elements, in all equal

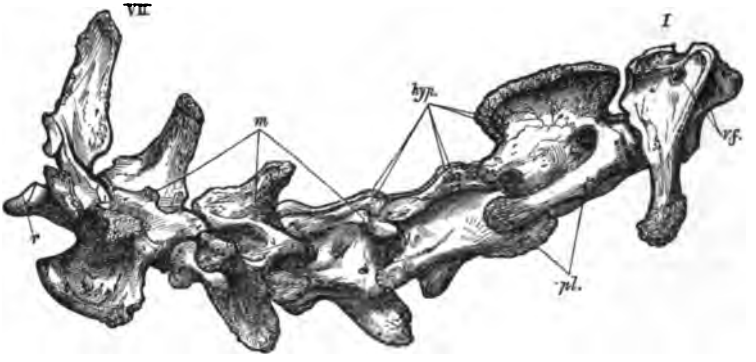
* Glitsch, I may mention, recently has usefully supplemented Pallas in a paper on the *Saiga*, chiefly devoted to its geographical distribution (*vide* Bull. Soc. Hist. Nat. Moscou, 1865, pp. 207–245).

to 42 vertebræ, the last, however, being a mere diminutive ossicle. Pallas* states that there are 5 lumbar vertebræ, without mentioning how many are in the tail.

In a very complete and excellently mounted skeleton†, in the College of Surgeons' Museum, of an adult Saiga, wild, or procured in its native haunts, I find that there but 11 caudal vertebræ, the final 2, as above, being ossified bodies of very minute size. The other vertebral regions agree with what has been mentioned as existing in the Society's animal.

The cervical vertebræ (fig. 1), possess characters by which individually they can readily be distinguished the one from the other. Their long diameters are unequal, as are those of the spinous and other processes.

Fig. 1.



The cervical vertebræ, about one-third their natural dimensions.

I., VII. First and seventh vertebræ. *v.f.* Vertebral foramen of atlas. *pl.* Rudimentary pleurapophyses of axis and third vertebra. *hyp.* Hyperapophyses or bifid spine-tubercles of second, third, and fourth cervicals. *m.* Fourth, fifth, and sixth metapophysial elements. *r.* First rib-facet.

But to proceed *seriatim* with the Society's male specimen, the atlas is remarkable on account of the great lengthening of the tranverse processes. These are somewhat flattened from above downwards, directed obliquely outwards and backwards, terminating in a roughened slightly bulbous manner. From tip to tip they measure $3\frac{3}{4}$ inches. The spinous process is well nigh obsolete, with deepish muscular depressions in front; the laminæ posteriorly have a low broad arch. The anterior shallow articulating surface presnts to the eye a crown-shaped outline, the lower and somewhat obliquely backwardly descending articulating surface of the concavity being mesially divided by a sharp ridge, so that the facets move on the post-basioccipital processes when the head is bent downwards. The

* *Op. cit.* p. 45.

† This male skeleton (No. 3729 A, interleaved Catalogue) is stated to have been obtained in South Russia, and purchased of Herr Möschler, 2nd October, 1867.

vertebral foramina pierce the sides of the body almost vertically, close behind the root of the cranial articulating processes. The postarticular surface of the body is tolerably level and semilunar. A short knobby sessile projection represents the ventral keel (hypapophysis); it is situated far back.

As regards the antero-posterior diameters of the bodies of the cervicals, the following numbers express a sufficiently near approximation to their relative sizes in inches and decimals:—1st, 1·2; 2nd, 2·3; 3rd, 1·6; 4th, 1·6; 5th, 1·5; 6th, 1·3; 7th, 1·0.

By such it is seen that the axis is the longest of the neck-vertebræ, as, indeed, obtains in many of the Ruminantia, although in the long-necked Giraffe and Camelidæ, where the whole of the cervicals are subequally long, it is not so obvious. Its neural spine is also by far the strongest, an inch high, and two antero-posteriorly; thick and stout, with an expanded, roughened, free border, cleft behind (hyperapophyses of Mivart*), but single and produced in front, where it overlies the posterior incised portion of the laminar arch of the atlas. The wide foramen for the vertebral artery enters the spinal canal at the anterior end and upper lateral surface of the body. The odontoid process is short, gouge-shaped, and surrounded by a wide, flattened, semilunar articular surface. The transverse processes are of considerable size, though nevertheless small, as compared with the great wing-like processes of the atlas. Moreover they disagree with these latter in being concave below and more convex above, and in their derivative angle from the body being more acutely backwards. There is only a rudiment of a pleurapophysis at the root of the diapophysis. A deepish ventral spine exists for nearly the whole length of the body. Posteriorly it is bulbous, but in front of this thin, sharp, and laterally compressed.

The third and fourth vertebræ present characters very much akin to each other. They agree in the great reduction of the spine, deeply bifid in both, smallest in the third, but in each only occupying the anterior half of the neural arch—in the great lateral expansion, flattening, or even forward concavity of the neural laminæ—in the broadening and more outstanding position of the transverse processes—in possessing large diapophyses—in the production of the keel being slightly less than in the axis, and more concavely marginate.

The distinctive differences are:—in the fourth having the highest spine; but the third, while less high, has the neural laminæ produced forwards as a low process, which fits into the triangular interspace between the posterior articulating (or zygapophysial) facets of the axis; in the laminar arch of the third being slightly broader and less concavely marginal; in there being only an obscure metapophysis in the third, whereas it is fairly developed in the fourth; in the transverse process and diapophysis of the third running antero-posteriorly almost in the same plane, whilst in the fourth they are at a distinctly obtuse angle to each other.

The alteration of the configuration of the fifth cervical consists in

* "Axial Skeleton in the Primates," P. Z. S. 1865, p. 576.

shortening of the body and transverse processes—in the latter being more bulbous terminally, and slightly upturned—in lengthening of the spine, which is uncleft— in a gradual increase of laminar arching—in separative distinctness of a metapophysial projection—in an alteration of the position of the transverse process to the pleurapophysis, so that they begin to be superior and inferior to each other instead of antero-posterior—in diminution of the ventral keel, which, however, is more inflated posteriorly.

At the sixth cervical, the inclination of the neck towards the shoulders is apparent. This vertebra altogether is shortened lengthwise and across; but the elongation of the spinous and pleurapophysial elements vastly increases the total depth. The changes observed in the fifth are here continued and augmented: for example, the neural spine is almost twice as long in the sixth; the inferior mesial ridge of the body is reduced to a hardly perceptible linear elevation; the transverse process and pleurapophysis have undergone such relations that the latter is absolutely posterior, its inclination is in that direction, and its breadth twice as great as in the preceding vertebra.

The seventh vertebra, as usual, puts on characters which assimilate it to the dorsal series. The most notable of these is the great elongation and backward direction of the spinous process; next, the total absence of pleurapophysis and foramina for the vertebral arteries; and lastly, the presence of a small costal facet.

Transition to dorsal vertebræ, though manifest in the last cervical, is yet somewhat abrupt, the first dorsal being altogether larger, with proportionally an enormously developed spine Moreover its body, as commencing the dorsal region ventrally, is set at an obtuse angle to those of the neck, the plane of the former being directed upwards and backwards, the latter upwards and forwards.

The pattern of the bodies of the dorsal vertebræ is twofold; but they run into each other; viz. as far as the 5th or 6th they are broadish and convex inferiorly, thence to the lumbar region laterally compressed and slightly carinate.

The laminæ throughout correspond to the length and strength of the spinous process. Where this is long and stout, the laminar arch is more acute, and, inversely, lower and arciform as the neurapophysis shortens.

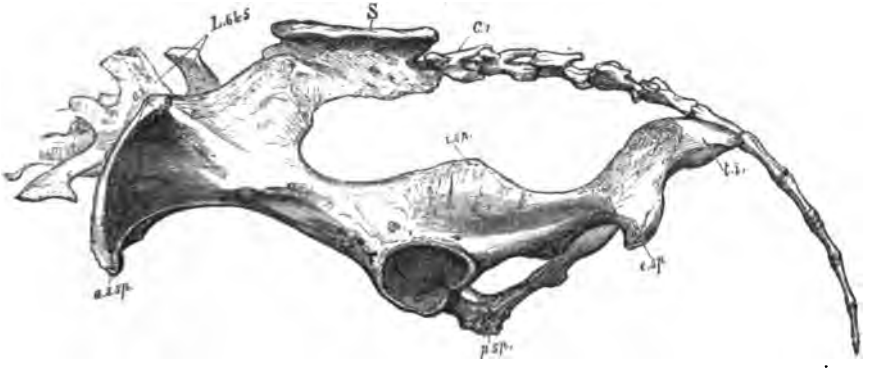
The spine of the first dorsal is very slightly shorter, and tapers more than the 2nd and 3rd, and equals the 4th in length, which latter has a truncate tip. These four spines slant well backwards. At the 8th or 9th vertebra an alteration is apparent, and, from the long spatular shape directed posteriorly, the spines become short, more erect, with an anterior terminal elongation, and at the last dorsal the change to the lumbar type is complete.

That which appertains as a marked feature of the lumbar vertebræ is the length of the transverse processes; at least, this is especially so in the penultimate and two preceding ones. They are thin, relatively narrow, excepting the first, and each terminates in a hastate manner. The first and last are shorter than the intervening

four. The hindermost pair of processes are the most delicate of all. Metapophysial prominences of moderate elevation rise up from the root of each transverse process, and they barely pass forwards beyond the zygapophysial articulation. The spines, nearly uniform in height, decrease in breadth from the 1st to the 7th, the last being less than half the breadth of the first.

Though the neurapophyses are pretty vertical, they appear to slant forwards from their anterior extremities being elongated as a blunt spine. The body of the hindermost lumbar vertebra is the stoutest and shortest, those in front subequal in long diameter.

Fig. 2.



Side view of sacrum, caudal vertebræ, and pelvis of male *Saiga*: ⅓ nat. size.
L. 6 & 5. The sixth and fifth lumbar vertebræ, the pointers being directed to their spines. *S.* Sacrum. *C.* 1. First caudal vertebra. *a. s. sp.* Anterior superior spine of the ilium. *c. i.* Crest of the ilium. *i. sp.* Ischial spine. *t. i.* Tuber ischii. *e. sp.* External spinous process of ischium. *p. sp.* Pubic spine.

The four coalesced sacral vertebræ together present the crucial figure which usually obtains in Ruminants. The first of the four vertebral elements, or that which yields the main abutment to the ilia, is a trifle over ¾ of an inch lengthwise in body; but transversely the diameter from the margin of one sacro-iliac synchrondrosis to the other is three inches. The pelvic surface is very level and smooth, and the auricular portion or augmented transverse process of moderate dimensions. The second, originally separate, element of the sacrum, here only distinguishable by the presence of the foramina, appears to have a limited share as a buttress against the ilium, just anterior to the bay of the great sciatic notch. It, along with the third and fourth segments of ossification, compose the narrow distal or handle end of the cross-shaped sacrum. The transverse processes and metapophyses are cemented together, so as to represent a doubly shelving mass on either side of the bodies. The four neural spines constitute but one consolidated mass, a couple of inches long, and dorsally thickened.

The caudal vertebræ may conveniently be regarded as consisting of two kinds:—those exhibiting enlarged or moderate-sized, and those with very diminished or obsolete processes. Of each there are five or six, according to where the line of demarcation is fixed; for the gradation of change is the opposite of abrupt. The three proximal to the sacrum distinguish themselves by the length of the neural spine, which runs backwards as a narrow, depressed, triangular bar, almost touching the root of the spine posterior to it. The third is rather shorter. The neurapophyses are well developed in each. In the first the transverse process is broad, assimilating to the hinder end of the sacrum. In the succeeding two the transverse processes are smaller and slant outwards and backwards from the distal segments of the body. The fourth, fifth, and sixth vertebræ have altogether much shorter processes, dorsal and lateral. The remaining caudal bodies are more or less expanded at each extremity. The tail as a whole is feeble, and terminally slender.

(B) *Costal Arches and Sternum.*—Of the thirteen vertebral* ribs the anterior eight have sternal attachments, the remainder come under the heading of floating or free ribs. The front five are more or less vertically placed, the sixth and those posterior by degrees take a wider sweep backwards. To the eighth, counting from before backwards, they progressively increase in length; thence they diminish in quicker ratio to the thirteenth. The last and the third ribs are subequal in length, the first and the second the shortest. The first costal arch, including its presternal keystone, when examined in front or from the interior of the thorax, is short and narrow; the remainder of the costal cavity by degrees enlarges, and is absolutely wide at the last ribs.

The first rib, stoutish and with little of a curve, is 4½ inches in its chord of diameter. It is flat, as are all the ribs within, but it is the most convex externally. Its angle and capitulum are thick; and the sternal end (*vide* fig. 3) is also much elongated.

These characters are considerably reduced in the 2nd and 3rd. The 4th, 5th, 6th, and 7th are remarkably thin, and broaden out distally. The 8th and ribs posterior are much narrower. The angles in all the ribs are badly defined.

The first sternal rib (Parker), or costal cartilage, abuts against the uppermost præsternum, and is very short. The succeeding four sternal ribs are each about 1 inch long; the 6th, 7th, and 8th lengthen and strengthen considerably, the rest of the free cartilages (sternal ribs) are wider, but long and styliform.

Seven osseous segments can be traced in the adult sternum (fig. 3); the last three, however, are adnate and interossified, those in advance have a meagre cartilaginous separation. The præsternum (*p.st.*), thick and narrow, is set at an obtuse angle upwards to the other sternal elements. Viewed ventrally, the 1st mesosternal piece (*m.st.*) has a cup-shaped outline, the narrow end forwards; the

* In using the term "vertebral," in contradistinction to "sternal" rib, I follow the precise morphological nomenclature of my friend Mr. K. Parker, in his valuable monograph 'Shoulder-girdle and Sternum' (1868).

others behind are subquadrate, increasing consecutively in length and width, the last being double the width of the first. The xiphosternum (*x*) flat, and obliquely downwardly bent, has a broad proximal base, which narrows suddenly and, becoming spatular, terminates with a slightly expanded tip.

Fig. 3.



Three-quarters underview of sternum, with cartilages and portion of the ribs attached. *p. st.* Præsternum. *m. st.* Mesosternum. *x.* Xiphosternum.

2. *Of the Cranial Framework.*

(A) *Different Aspects of the Skull.*—In several particulars the skull of *Saiga tartarica* is isolated or unique amongst living Ruminants, though, as will be shown hereafter, one or more ancient types foreshadowed the peculiarities. Pallas (*l. c.* tab. iii. figs. 9 & 10) has given reduced figures of it in profile, and in front foreshortened; and Dr. Gray, in his 'Catalogue of Mammalia in the British Museum,' 1852 (tab. vi. figs. 1 & 2), has likewise represented similar views. In those figures, however, the horns and general outline of the skull seemingly have been more attended to than definition of the coadapted osseous areas; hence fresh representations are, in a great measure, a necessary adjunct to a description of the bony elements of this *bizarre* Ruminant's skull. The skull of the hornless female and the horned male necessarily exhibit different aspects*.

Dealing with the latter, when looked at sideways (shown in fig. 5), the prominent features may be summarized as follows:—

* Skeletons of the *Saiga* hitherto have been rare in this country. Besides the Hunterian and the present specimen, I only know of one other, which was obtained some years since by the Museum of the University of Cambridge—where in addition are two skulls (male and female), all being from wild animals. Professor Newton obliged me by kindly transmitting the two latter crania for my inspection. Comparing these with that here described and the College of Surgeons' specimen, I detected little differences worthy of special record other than sexual, *i. e.* diminution of osseous sutural ridges and absence of horns in the female. I may also add that the tympanic bullæ in the female were relatively more inflated than in the male; in the latter laterally compressed and very ovine.

1st, the extraordinary shortness of the nasal region, the face, as it were, being scooped out, leaving only an exceedingly narrow extension forwards of the maxillary and premaxillary bones; 2nd, the great vertical depth of the naso-maxillary region; 3rd, the relatively prominent, large, and staring orbit; 4th, the very small, shallow zygomatic arch; 5th, the moderate-sized, roundish, occipito-temporal region; 6th, the long, erect, tapering horns.

In bird's-eye view, or from above, the skull is elongate, somewhat diamond-shaped, the palato-maxillary being considerably longer than the parieto-occipital segments. The orbits form two salient projections, behind and above which the horns start forth.

Examined in front, or facially foreshortened (as in fig. 4), the horns appear to slant well backwards, the frontal bone being rather depressed. The broad orbital rings stand well out. The short nasals are raised, below which the turbinal bones are exposed; and beneath these, between the inner borders of the maxillaries, is an immense narial vacuity. The irregular-surfaced, long, narrow palato-maxillary shelf forms the floor of the forwardly jutting nares.

Fig. 4.



Foreshortened facial view of skull and mandible of the Society's adult male *Saiga*.
Fr. Frontal. *Na.* Nasal. *Mx.* Maxillary. *Pmx.* Præmaxilla. *Mn.* Mandible. *Vo.* Vomer. * Points to pit of lachrymal duct.

From behind, the cranium presents superiorly a broad flattened

arch, the orbital plates forming the outer boundary. The horns issue vertically above the small temporal fossæ. The occipital region is relatively narrow and ovoid; the semilunar condyles are no way prominent, and laterally bound a squarish foramen magnum. The compressed and, in this view, thin, paramastoid processes are but moderately long and perpendicularly set.

The base of the skull (see fig. 6) is characterized—1st, by great orbital breadth; 2nd, by the molar arch enclosing a rounded pterygo-malar space, posteriorly limited by a wide glenoid articulating surface; 3rd, the basioccipital region is broad relatively to its length; 4th, the tympanic bullæ of medium size; 5th, the posterior nares very deep and moderately wide; 6th, dental portion of palate broad, but much narrower in front, slightly concave from behind forwards and across; 7th, the masseteric portions of the maxillaries bulge considerably beyond the alveoli; 8th, the premolar teeth incline inwards, a ridge running on to the premaxillaries; 9th, the premaxillaries are produced forwards, in a flattened beak-like manner.

I may further add, as a feature of some moment, that when the skull rests basally on a horizontal surface (the top of a table for example), the crown and nasals strike upwards, nearly parallel, at about an angle of 20° to the plane. This, so far as I am aware, is not the case with any other living Bovine form; indeed, instead of the parietals and nasal tops exhibiting parallelism of plane, they trend downwards at a more or less obtuse angle from each other. *Alces* and *Rupicapra* offer no exception, though the horns of the latter are well nigh erect.

(B) *Individual Bones.*—The parietals (*Pa.*) are short and low-arched. The coronal suture is strongly marked by two semilunar ridges, whose concavities are forwards; and they blend together in a line with the sagittal suture, and run on in a slight ridge towards the prefrontal region.

Between the horns, and partly to their rear, the frontal bone (*Fr.*) is moderately elevated, with shallow lateral depressions. In advance of their roots, however, the bone shelves rapidly to a lower horizontal level, continuous with the nasals. The osseous horn-core springs obliquely backwards, above and slightly behind the orbit. A large triangular supraorbital foramen is situate at their base, and half an inch beyond the outer raised border of the bone terminates in a small eminence joining the lachrymal. The broad fronto-orbital plate juts well outwards, producing the greatest cranial breadth at this part, as it forms the upper and posterior circuit of the orbit. An irregular bordered wedge-shaped portion of the frontal is inserted betwixt the nasal and lachrymal bones, which, however, falls short of, and is much higher than, the maxillary bone.

The diminishment of the nasals and correlated extensive intermaxillary space, or open narial region, are the most extraordinary features of the skull. The stoutish ossa nasi (*Na.*), 1-inch long, together constitute an almost equal-sided triangle, instead of an elongate splint of bone surmounting the nasal arch, as in general

obtains in the Ruminant skull; including the short-nasaled Elk. As already intimated, they are set in a plane horizontal to the anterior portion of the frontals, though, from the descending sweep which the maxillaries take, the nasals appear to have a more upward cast than they in reality possess. Their upper surface is smooth and convex, the fronto-nasal suture being nearly transverse. The anterior free borders are rough for the attachment of the nasal cartilages; and on each outer corner is a small subquadrangular wing-piece, 0·3 inch in diameter, which inferiorly is suturally connected with the lachrymal. No portion whatsoever of the maxillary or premaxillary bones is in conjunction with the nasals; in this respect, therefore, they differ materially from those of most Ruminants. Even *Alces americana*, distinguished by shortened nasals and præmaxillæ, does not agree with *Saiga*, as its maxillæ and nasal bones are partially coadapted, although the præmaxillæ are widely apart from the latter.

Examined from in front, the ethmoid and turbinate bones are large and sinuous, the inferior turbinate, especially, being tilted at an acute angle upwards and forwards. A small portion of their anterior ends projects beyond the interior border of the lachrymal; and to this inferior turbinate portion the upper lateral nasal cartilage is partially adherent. In spite of the very diminished length of the nasals, it is to be observed that their tips reach a point perpendicular to the infraorbital foramina or anterior true molar, the latter, as to a certain extent is the case in the true goats, being as it were, thrust backwards relatively to the facial region.

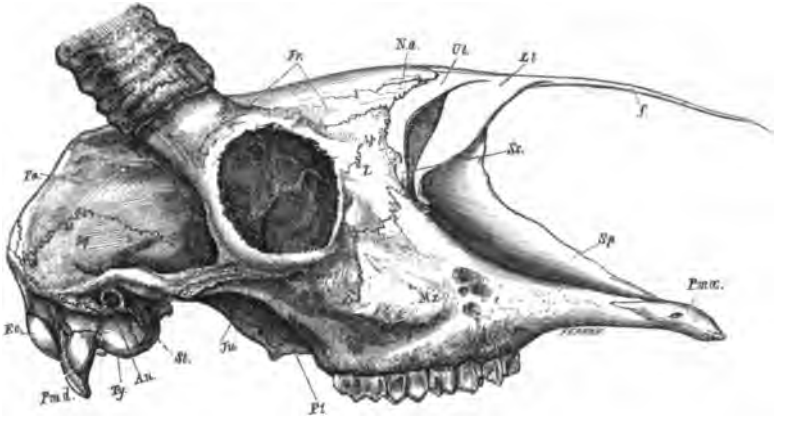
The development of the lachrymal bone is peculiar and noteworthy. In some senses, by its great vertical depth, does it give that strange aspect in profile to *Saiga* which elevates, as it were, the nasal region of the animal; while at the same time, by its more than ordinary enlargement, the lachrymal entirely excludes the maxillaries from reaching the nasals, as obtains in all the other artiodactyla. In shape, the lachrymal (*L*) is irregularly contoured, though it exhibits a tendency to a quadrate figure, divided, however, by a portion of the raised thin orbital ring.

The cheek-surface is more or less impressed by three concavities, the chief of which is the ante- or suborbital fossa. This is obovate, shallowish, but broad, and lies at the inferior border of the bone; above it is a small osseous tubercle. The fossa contains the so-called crumen or suborbital gland. About a sixth share of the ring and inner orbital plate is constituted by the lachrymal. The foramen for the lachrymal duct pierces the bone within and just beneath the anteorbital angle. The superior border of the lachrymal joins the frontal, and barely touches the middle outer border of the os nasi. Below, the lachrymal intrudes into the maxillary, as in Antelopes and Sheep, agreeing with the former, however, in the angular abutment of the piece. To the narial side of the ascending process of the maxillary an inlaid splint of the lachrymal descends; and the root of this is pierced by a large foramen (* fig. 4), wherein the lachrymal sac is lodged. This opening, in the fresh condition of the parts, is overlain by the sesamoid nasal cartilage (*Ss*, fig. 5); whilst the

edge of the inferior point of the lower lateral cartilage rests in the groove in front of the foramen.

The malar or jugal bone (*Ju*) occupies between a fourth and a third of the orbital ring; forms a broad buttress, which rests on the antrum of the maxillary, and sends back a short narrow spur to join the zygomatic process of the temporal.

Fig. 5.



Skull of male *Saiga* in profile, with nasal cartilages *in situ*.

Na. Nasal. *Fr.* Frontal. *L.* Lachrymal. *Mx.* Maxilla. *Pmx.* Præmaxilla. *Pa.* Parietal. *So.* Supraoccipital. *Eo.* Exoccipital. *Sq.* Squamosal. *Pmd.* Paramastoid. *Ty.* Tympanic. *Au.* Auditory bulla. *St.* Styloid. *Pt.* Pterygo-palatine. *Ju.* Jugal. *Ul.* Upper lateral cartilage. *Ll.* Lower lateral cartilage. *f.* Fibrous cord of nares. *Ss.* Sesamoid. *Sp.* Septal cartilage, its fibrous portion being partially removed.

The premaxillaries (*Pmx.*), like the nasals, are conspicuous by their small size or abortive development. Each is no more than $1\frac{3}{4}$ inch in extreme length, and, unlike that of any other Ruminant, merely tips the maxillary, without the palatal portion reaching the vomer. Both limbs of each >-shaped premaxillary are much flattened from above downwards, the upper stouter one possessing only a very limited tendency to override the projecting process of the maxilla.

The somewhat scalene-figured cheek-surface of the maxillary bone (*Mx*) has a pronounced masseteric ridge, which runs well up towards the orbit. In front of its anterior and lower end, perpendicular to the last premolar, are four large sieve-like foramina; and through these the thick infraorbital nerves reach the facial region. I have already spoken of the long nasal or ascending process of the maxillary which dovetails between the divergent lachrymal pieces; but the opposite or rostral portion of the maxilla is equally interesting. This latter anterior segment, which forms the anterior palatine roof or premarial floor, and in a less degree contributes to the outer

prenarial wall, is remarkable on account of its outwardly long cylindrical character. In these respects, and in the absolute shearing out of the upper or nasal border of the maxilla, this bone in the Saiga is distinguishable from that of every living Ruminant. The antrum of Highmore, or sinus maxillaris, is very capacious, and the osseous walls altogether thin. A portion of it projects more than usual into the pterygo-maxillary and zygomatic fossa; and this gives, when seen from the palate, a rounder figure to the fossa than obtains in ovine, caprine, or cervine forms. In the Chiru, *Panthalops hodgsoni*, an analogous inflation and extension of the postmaxilla is observable; and it is further curious to note that both the Saiga and the Chiru are distinguished among antelopes on account of their nasal appendages. Regarding these and the enlarged larynx of Pallas's *A. gutturosa*, Turner remarks (P. Z. S. 1850, p. 168)—"These seem to be physiological adaptations, in no case marking a group, and therefore insufficient to warrant generic distinction, which has been made in the two latter instances." So far I agree with that meritorious author; but had he seen the skulls, he would have found other distinctions whereon to base separation.

The palatal plate of the palate bone (*Pl.*), pierced by the posterior palatine foramen, is relatively large for a bovine. Behind it is broad and widely arching over the rounded front border of the posterior nares, gives much greater breath to this part than is found in the Antilopidæ or even Ovidæ; with its neighbouring plate of the opposite side, they, together crescentiform, reach forwards mesially to opposite the middle of the posterior lobe of the penultimate molars. As far as this latter disposition is concerned, it evinces leanings towards Sheep and Goats rather than Antelopes; moreover in Deer and Cattle these horizontal palatal plates in general pass to opposite a molar beyond the above. The very thin, moderately broad, yet remarkably deep, vertical pterygo-palatine plate of the Saiga, as in other ruminants, mainly forms the inner wall of the sphenomaxillary fossa, being strengthened moreover by the somewhat united stouter pterygoid process of the sphenoid bone.

The opening of the posterior nares is two inches deep, and about one inch wide. Its open rounded palatine end is placed some distance behind the last molar. Thus in position it agrees with its hitherto believed ally the Chiru Antelope; but in shape it disagrees, reverting to the ovine postnarial form. The anterior narial aperture of the Saiga, compared even with its own large posterior narial passage, is of excessive proportions, quite 1½ inch across, and between 2 and 3 in depth; inferiorly the bone is smooth-surfaced.

The slender columellar vomer (*Vo*), whilst vertically high, is remarkably short antero-posteriorly; and its palatal attachment neither advances to the anterior narial aperture nor recedes to the posterior one. The spheno-rostral part, however, is well seen behind; and in the live animal the anterior bony septal deficiency is made up for by cartilage and soft membranous substance. It is curious, though, that, excepting above, the vomer anteriorly is not grooved nor has everted lips, as is the rule in Ruminants.

The squamous portion of the temporal bone (*Sq*) has a low smooth-surfaced longish elliptical figure, its anterior angle abutting against the alisphenoid. The zygoma arises by a thin broadish horizontal piece, scooped out at its root above, and perforated by a wide foramen; and as the bone arches forward to unite with and overlie the jugal, it thickens. The glenoid (*gl*) or articular surface is pretty convex, and, with a shallow postglenoid sulcus, much narrower than in Antelopes generally; and the large postglenoid foramen still further reduces it. The articular eminence or tubercle is small, but well marked. The auditory meatus (*au*) has a moderate diameter, and is directed very gently upwards and forwards. The styloid process or plate is short; and the fossa for the attachment of the articular portion of the stylohyal is likewise as in Sheep, small.

The mastoidal eminence is not nearly so full and prominent as in most Bovidæ; it nevertheless rises in a pronounced roughened ridge, which, however, is scooped out towards the root of the paramastoid. The tympanic bulla (*Ty*) is rather well developed, and moderately inflated.

The paramastoid process (*Pmd.*), one inch long, descends almost vertically; seen from behind, it is laterally compressed, with a slight outward obliquity of the posterior border; but from the side, is flat and V-shaped, and partially rests against the tympanic. A wide, deep excavation intervenes between the paramastoid and the condyle; and this cavity narrows to a curved fissure betwixt the tympanic and basioccipital bones.

A narrow strip of the supraoccipital (*So*) forms the hinder portion of the top of the skull. Its lambdoidal suture, in the Society's male specimen, runs transversely with a double forwardly convex curve, this being straighter in the Hunterian skeleton. The superior curved line describes a full arch, is rough, and only moderately prominent; an inferior curved line, less marked, is well nigh obsolete. An external occipital protuberance is but very partially denoted, although the spine is broad and well developed.

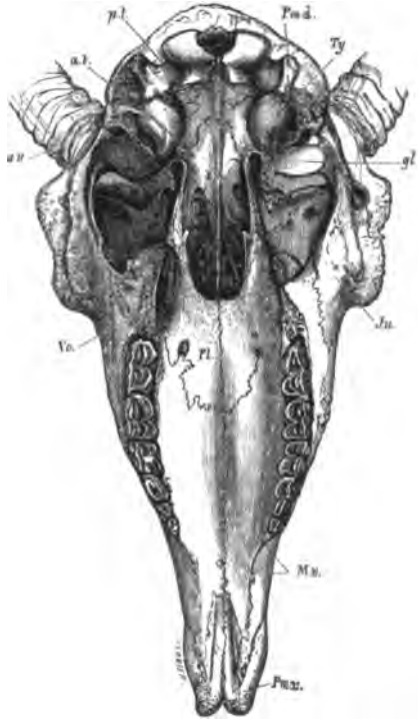
The hollows to which the long muscles of the neck and the ligamentum nuchæ cranially fix themselves are distinctly and separately impressed, giving a rugose surface to the occiput, which is altogether broadly arched. The supraoccipital facies is neither so bulging as in Antelopes and Goats, nor so perpendicularly scooped as in Deer It agrees more, therefore, with Sheep, but in the male Saiga has not such strong ridges and concavities as in the thicker-necked Ram.

The articular condyles of the exoccipital (*Eo*) have each a transverse ungulate figure, which, convex from before backwards and laterally, is yet less prominent or posteriorly sustained than in the Antelopes, coinciding rather with Sheep and Deer. The nearly circular or slightly transversely oval* foramen magnum pertains to *Ovis* in its moderate diameters. Divergently forwards from the inferior root of the condyles, two transversely ridged, large-sized eminences stand out (*p. t.*), these in disposition and breadth following the type of

* Decidedly ovoid in the Cambridge female skull examined by me.

Cervus. They correspond to Turner's* so-called posterior tubercles of the basioccipital. The basioccipital bone (*B o*), an inch long and very nearly as much broad, is slightly bayed on either side, though somewhat broader in front; and is furnished with two additional anterior, externally salient and roughened capitula, Turner's anterior tubercles (*a. t.*). The basioccipital itself is flat, or has only a very lightly raised mesial linear ridge; and in this feature, as well as continuousf ore breadth, nature of the anterior tubercles, and narrow fissure between these and the tympanics, decidedly conforms to what obtains in *Ovis*.

Fig. 6.



Base of the skull of the adult male, reduced less than three-sevenths nat. size, as is fig. 5.

B o. Basioccipital. *p. t*, posterior, and *a. t*, anterior tubercle of basiocciput. *Pmd*. Paramastoid. *Ty*. Tympanic. *gl*. Glenoid. *B s*. Basisphenoid. *au*. Auditory process. *Vo*. Vomer. *Ju*. Jugal. *Pl*. Palatine (horizontal plate). *Mx*. Maxilla. *Pmx*. Præmaxilla.

The basisphenoid (*B s*), unusually wide, flat, or linearly raised like the basioccipital, diverges at an obtuse angle from that bone,

* P. Z. S. 1850, p. 167.

and only narrows towards the rostral insertion of the vomer, where it is convexly ridged. The long lamellar external and internal pterygoid plates are so closely conjoined as to be with difficulty recognized as separate elements. The former, lanceolate, and ½ inch in greatest breadth, springing in front of the sphenoidal foramen, does not, as in *Capra* and *Ovis*, trend so horizontally forwards, but strikes more obliquely down, and suturally connects itself with the vertical palatine plate. Its posterior edge agrees with the Antelope's in being narrow, and not everted, as in Sheep and Goats. The latter, internal spheno-pterygoid plate is even more delicate at its root, and arises close to the posterior edge of the pterygo-palatine plate, thence running backwards at a sharp angle to the external pterygoid plate, lays like a splint inside it, and again curves forwards, to be prolonged into a thicker but nevertheless slender rod, terminating in a short hamular process. The alisphenoids, as in *Ovis*, present only a rudiment of that bony plate so conspicuously developed forwards at the back of the orbit in *Pantholops* and other of the Antelopes. The sphenoidal wing in Saiga is altogether small, obliquely ridged, contracted antero-posteriorly, and curved sharply backwards between the postfrontal and squamo-temporal elements. The orbito-sphenoid seen from below has a larger superficies than the alisphenoid, though in itself small. It has a smooth concave surface, the foramen opticum obliquely penetrating it just above the root of the internal spheno-pterygoid plate.

(C) *The Mandible.*—The dentary portion of the body of the bone, when the mandible is placed in natural position, has a moderate curvilinear direction upwards and forwards. At the last molar its vertical depth is 1⅓ inch, but, correspondingly, less than 1 inch at the premolar. Anteriorly the diasteme narrows very considerably in a tapering manner, and then widens into a somewhat scooped or shovel-shaped symphysial part, 1 inch long and as much wide, into which the horizontally placed incisors are inserted. A diminutive ridge runs backwards from each outer incisor towards the molar alveolus. The mental foramen is situated, outside, immediately behind the symphysis. The ascending ramus, as mentioned, strikes upwards at nearly right angles to the dental plane, the angle being produced as a thin but broad and rounded sweep of bone. The head of the condyle is short-necked, the articular surface transversely oblong and very gently concave. The sigmoid notch is shallow and narrow, the long coronoid process of nearly uniform breadth throughout.

The inferior maxilla in the male measured 7½ inches horizontally from symphysial extremity to ramal angle; and adding an inch for the median incisors, the extreme length would be 8 inches.

(D) *Dentition.*—In the Society's adult male specimen the set of teeth were deficient in the anterior lower premolar and two middle incisors. I found the skeleton at the College of Surgeons more complete, and answering to Pallas's brief statement of the dental numbers in the full-grown animal. The formula, therefore, of the permanent dentition is that of other hollow-horned Ruminants, to wit:—

$$\text{I.}\ \tfrac{0-0}{3-3},\quad \text{C.}\ \tfrac{0-0}{1-1},\quad \text{P.M.}\ \tfrac{3-3}{3-3},\quad \text{M.}\ \tfrac{3-3}{3-3} = 32.$$

The above author observes "*molares utrinque 5 in junioribus.*"

The extreme length of each series of the grinding-teeth above and below is 2·7 inches. The palatal breadth or distance between the two hindermost upper molars is 1·6, and betwixt the opposite anterior premolars 1·1 inch. The pattern of the teeth, as might be anticipated, is bovine, although they do not strictly conform to any special genus; for instance, the upper molars are sheep-like, the premolars rather antilopine, and the incisors a modification of both.

The maxillary premolars are altogether small—the two anterior particularly so; but the third is somewhat larger. The first is single-, the second double-, and the third triple-rooted. Measured seriatim they have individually a breadth of 0·2, 0·3, and 0·4 inch, and a transverse diameter of 0·18, 0·2, and 0·3 inch. Their external longitudinal enamel ridging is but moderately developed, the third premolar being comparatively smooth-surfaced, or with only a slight development of the anterior ridge.

The three true molars behind these together occupy a space of 1·8 inch long; and they increase in size from the first to the third. As in the Bovidæ, their antero-posterior is greater than their transverse diameter; in other words, their breadth is greater than their thickness. Nevertheless they are stout, and relatively and absolutely thick, indeed much more so than obtains in Antelope-skulls of corresponding dimensions. The enamel layers are of considerable density. The two outer depressions are remarkably shallow and broad, and the bounding longitudinal enamel ridges very moderately elevated—notably so in the last molar, its anterior ridge alone being well marked. On the crown the semilunar vertical enamel folds are simple, with a medium-sized cleft or valley; no trace of secondary folds exists. Internal accessory enamel columns, as in the Ox, and supplemental lobes, are wanting.

The crowns of the three upper molars have the following dimensions:—The anterior 0·5, the penultimate 0·7, and the posterior 0·8 inch broad, and each is about 0·4 inch in greatest thickness or transverse diameter.

The lower incisors and canines closely set together form a fan-shaped expansion 1·7 inch wide; they are not entirely procumbent, but rather tilted obliquely forwards and upwards. The canines or outermost of the four on each side are the smallest; and the incisors progressively increase in size from without inwards. Their outer edges overlap the median incisor, being lowest. The incisors are all more or less spatulate, with a sharp cutting-edge; their upper outer border, where the neighbouring tooth overrides, is slightly ridged; and from the summit the surface shelves to either side. The largest, innermost incisor is moderately expanded at the summit, the others less so.

A long slender diasteme precedes the mandibular molar series. The first premolar present, situated at the uprising of the ridge, is almost conical, and very small. No trace of its whereabouts could be detected in the mandible of the Society's older animal; and in the skeleton of the wild Saiga at the College of Surgeons, on one side it

was very rudimentary; so that I am inclined to think this tooth is lost comparatively early in life. The succeeding premolars, 2 and 3, are of fair size, being a trifle broader, though not quite so thick, as the upper premolars 1 and 2, with which they come into contact during mastication. These latter are short; and the former accordingly are lengthened and raised somewhat above the plane of detrition, chiefly however mesially. The said two hinder lower premolars are each sinuous in contour, from the tolerably pronounced character of the enamel ridges and concavities. The last has well-defined lobes, and is rather larger than that in advance. Together they are 0·6 inch broad, and about 0·2 thick.

The hindermost inferior true molar, quite 1 inch broad and 0·3 inch greatest thickness, has, as in Bovines, a third posterior lobe, of larger size. The penultimate molar is 0·6, the antepenultimate 0·5 inch in antero-posterior diameter, and they are each slightly narrower across than the last tooth of the series.

(E.) *Comparison of the Cranium and Dentition.*—"Sceleton, maxime quoad cranium, singulare est"*. These few words of Pallas comprehend much. When Dr. Falconer† wrote that "in the *Sivatherium* we have a Ruminant connecting the family with the Pachydermata, and at the same time so marked by individual peculiarities as to be without an analogue in its order," he was at too remote a distance from brother naturalists or easy access to libraries; else he he would at once have recognized in the *Antilope saiga* certain of those *outré* features which he and Captain Cautley so graphically describe in the Murkunda fossil. Other, later writers have not failed to note resemblances. In the Saiga, unquestionably, we have a repetition of the short nasals of the Sivathere, and large size of the nasal échancrure; but with these peculiarities further likeness ceases, unless it may be that the lachrymal and præmaxilla bore analogy; these, however, the state of the fossil specimens does not admit of comparing. The *Titanotherium proutii* of Professor Leidy‡ and *Megacerops coloradensis* of Dr. Linz§, are representative of two ancient North-American forms which obviously have relations to the above, inasmuch as thickness and diminished length of nasals predominate. The form of teeth in the first two of these fossils is unlike that in *Saiga*; those of the third are not known. All three, as well as the allied *Bramatherium*, are furthermore distinguished from *Saiga* in their possessing four horns, the anterior pair prefrontal.

When we come to compare existing Bovidæ with that under consideration, none have such short nasals, premaxillaries, and scooping out of maxillæ. In these respects there is no connexion whatever with its associates *Gazella*, *Procapra*, *Pantholops*, and *Cervicapra*.

In *Pantholops*, however, as in *Eleotragus* and *Rupicapra*, the

* *Op. cit.* p. 44.

† Asiatic Researches, vol. xix. (1836), and, with additional MS. notes, in Dr. Murchison's collected edition of his works, 1868.

‡ The Ancient Fauna of Nebraska, p. 72.

§ Acad. of Nat. Sci. Philadelphia, Meeting for Jan. 1870.

præmaxillæ fall short of the nasals; but in all these Antelopes, the latter bones abut to a considerable extent against the maxillæ.

In the limited section of Caprine Antelopes of Gray, Ovine Antelopes of Turner, *Capricornis*, *Nemorhædus* and *Budorcas*, the nasals are but of moderate length, the premaxillaries do not reach them, and the maxillæ barely coalesce nasally. In some Oxen, *Bubalus* and *Bibos* to wit, and also in the aberrant Sheep *Ovibos*, the premaxillary stunting is marked, but the relation of nasals to maxilla is quite different from the peculiar one in *Saiga*.

The complementary changed relations of the facial bones of *Saiga*, and especially the increased height but antero-posterior shortening of the lachrymals, differ quite from the modern Ruminant skull, where, as a rule, the horizontal is greater than the upright breadth in the latter bone. Besides these major differences, the Saiga recedes from supposed alliance with *Gazella* and *Cervicapra* in absence of suborbital fissure—though, exceptionally, the Chiru agrees with it in wanting a fissure; but it differs from each in the very slight impress of suborbital fossæ.

Indeed, within certain limits, it may be said that the suborbital fossa of *Saiga*, though wider, has more the shallow roundish character of that of Sheep than Antelopes. The opposite of this remark applies to the masseteric ridge, as the higher position of the Antilopine orbit gives increased length of ridge, as in the Saiga.

Goats, with their elongate fissure, and Deer, with a most extensive wide one, and very deep lachrymal fossa, are remote in facial construction from the type in question.

The group which Dr. Gray designates "Antelopes of the field," including *Antilope*, *Gazella*, *Tetracerus*, *Cephalophus*, and other genera, and the same author's "Antelopes of the Desert," *Alcephalus* &c., have all large, more or less inflated tympanic bullæ. It is to the former of these groups that the Saiga has been assigned; and the development of its ossa tympani in a fair degree shows derivation from it, or unity of stock. In the Society's specimen the bullæ are rather more inflated than in the skull at the Hunterian Museum; and both are fuller and not quite so laterally compressed as in the so-called Cervine Antelopes, *Ægocerus*, &c. The Caprine Antelopes are still further removed, judged of by this single character; for in them the tympanics are moderate and compressed.

The triangular, horizontally elongated and ridged tympanic bones of the Goats and the Deer even more markedly deviate.

In Sheep, as Turner observes, there is a small auditory bulla; but I find in *Ovis vignei* that the bulla is not only of moderate, but indeed of fair size, and quite equal in relative magnitude to that of the Saiga, its shape rather more elongated, but not unlike the latter.

The centre point of the skull, the basioccipital bone, forms a good diagnostic mark between the Antelope groups, especially when taken in conjunction with the tympanic elements and disposition of the facial bones. Usually the basiocciput is longish and narrow, high, convex, and mesially grooved antero-posteriorly. Continuous

ridges bound the groove; and in front and behind a pair of large prominences or tubercles are developed. In the true Ovine, Cervine, and Caprine Antelopes these parts present varied grades of development. The genus *Oreotragus* alone has a tendency to flattening, and *Nemorhædus* evinces relative broadening of the bone.

In the Sheep and the Goats the basilar bone assumes a totally different form; it is as broad as it is long, widest in front, flat or slightly concave, the posterior tubercles small, and the anterior ones extended onwards rather than highly raised. The same bone in the Saiga, as previously described, essentially resembles these.

The Rocky-Mountain Sheep, *Ovis montana*, offers analogy to the Saiga in having an outer mastoidal depression at the root of the paramastoid. This, partially, is the condition met with in some Oxen; but in Goats there is a great mastoidal eminence: in the Antelopes and Deer it is also convex, but less elevated.

The Saiga, in the backward extension of its horizontal palatines, width of postero-nares, and long, vertically high spheno-pterygoid plates, is interesting, as this is not witnessed to the same extent in living Ruminantia. The short and higher rounding of its skull is also met with in the Chamois, *Æpyceros* and *Damalis*.

There is something peculiar in the dentition; absence of supplemental lobes separate it from the Cervine Antelopes and all Deer; but the teeth might belong to the Gazelle group, though as closely Ovine in character. In its subequal incisors, however, it is unlike the antilopine section that have the median ones extra large and expanded at the summit.

Altogether, the cranial anatomy of *Saiga tartarica* has for its groundwork a basioccipital derivatively modelled from Sheep-structure; to this are added mastoid, auditory, and tympanic elements modified between those of *Antilope* and *Ovis*. The rest of the broad basis cranii, palatal region, and the foramina are built typical of Sheep, but correlated with change of cranial form. The upward set of the basisphenoid and the postcranial contour incline to those of Goats, though the glenoid articulation and posterior border of the maxilla are truly Antilopine.

The horns and interfrontals pertain to the latter group in shape; but the diaphanous corneous texture, as the older naturalists did not fail to observe, are restrictedly Bovine. Forasmuch as stout abbreviated nasals and præmaxillæ indicate family connexion, the Elk and Oxen show a tendency to agreement with Saiga; but the facial region, notwithstanding, by no means approximates close, and rather, in the latter, denotes ancient Sivathere parentage. In fine, the extraordinary-looking soft structures of the nares and the coordinate adaptation of these with deficiency of osseous framework, as in the Tapirs and other Pachyderms, point to physiological function of the nasal region of a kind different in the extreme from the ordinary living Ruminant type. That in by-goue ages kindred proboscidian Ruminants were more numerous, and varied concomitantly in cranial characteristics, the fossil remains attest.

3. *Bones of the Extremities.*

(A) *Scapula and fore limbs.*—Whilst the shoulder-blade shows no special specific or generic mark, it yet, I would say, is impressed more with Antilopine than Ovine form. This, I think, is owing to its somewhat greater length to breadth and upturned axillary border. Its long diameter is 7, and breadth at vertebral end 3¾ inches. The supra- is about a third of the breadth of the infraspinous fossa; the spine has a concavity towards the latter; the acromion process is obsolete, a tubercle of bone alone representing it. There is a well-marked neck, flattish and widened by a flange of bone at the axillary border. The glenoid cavity is shallow, incised at the coracoid end, this process being short and broad. The tricipital border is thick, wide, and markedly grooved, and towards the vertebral end rises at a right angle to the plane of the infraspinous fossa in a prominent strong plate of bone for the attachment of the teres major muscle. The cartilage at the spinal end was semiossified in the male specimen.

The shaft of the humerus is roundish, but with a tendency to posterior angularity. Head and neck relatively to the shaft are massive. The great tuberosity is very broad, strong, and thick, obliquely salient inwards. The deltoid eminence and elevation for attachment of the teres major are each well developed. The bicipital groove is flattish and unusually broad. The articular capitulum is deflected posteriorly, its upper surface being moderately convex and broad; the inferior extremity presents little or no difference from that of the Sheep.

There is a moderately broad shaft to the radius, which has a slight bend forwards, and, as usual, is convex in front, but almost flattened behind. The stout olecranon rises 2 inches above the radius; and the shaft of the ulna is represented by a slender rod continued to the short styloid process, where it somewhat widens out.

The carpal bones consist of the usual ruminant number, 6, viz. the scaphoid, semilunar, cuneiform, and pisiform in the first row, and os magnum (with united trapezoid) and unciform in the second. Proximately the scaphoid, lunar, and cuneiform are arranged in a close-fitting semilune, the pisiform bone being, as it were, accessory, placed posteriorly and comparatively free. The magnum and unciform form an inferior and reduced semilune, modelled accurately to the upper surface of the metacarpal pillar. A sufficient hollow is provided behind these bones for the tendons &c. to be bound firmly by transverse ridges of fascia, and enabling them to play with security during the frequent jerking movements of this part of the limb when in action.

The scaphoid, of good size, has an upper deepish median hollow which lodges the greater part of the inner facet of the radius. The said hollow is somewhat laterally constricted, but posteriorly rises as a tuberosity. The underside of the scaphoid occupies more than the outer moiety of the connate os magnum and trapezoides. The uneven outer side of the bone rests in the corresponding rough concavity of the lunare.

The lunare or semilunar bone has a figure-of-eight shape, but with numerous prominent angular facets. It is smaller than the scaphoid. The proximal surface articulates chiefly with the median fossa of the radius and the crest on the outer border of the inner facet. Its lateral constrictions are filled by the corresponding eminences of the scaphoid and cuneiform. Distally it presents two small flattish quadrangular facets, and behind these a couple of grooved ones; these coincide with the approximate parts of the magnum and unciform.

The cuneiform offers two angular faces, which wedge into the neighbouring concavity of the lunare. Proximally the cuneiform articulates by a raised portion with a small part of the radius; and outside this there is a deep oblique groove for the reception of the styloid process of the ulna. The distal surface rests solely upon the unciform bone; a posterior outer and downward process rests in the fossa on the outside of the unciform.

The long diameter of the pisiform is vertical. It is a rather large, ovoid, convex, and laterally compressed bone, the inner surface being deeply grooved for the transmission of tendon.

The os magnum differs from all the bones of the row in being relatively thin, flattish, wide and diamond-shaped. The upper surface is quite level on the outer half for the reception of the scaphoid; and on the inner half it presents fore and aft facets, upon which, as aforesaid, those of the lunare rest. Its articular surface with the unciform is concave. The metacarpal articular surface is quite a horizontal plane, except the trapezoidal portion, which is rather more indented. The homologue of the trapezoid bone is only indicated by a tuberous condition of the inner posterior angle of the magnum.

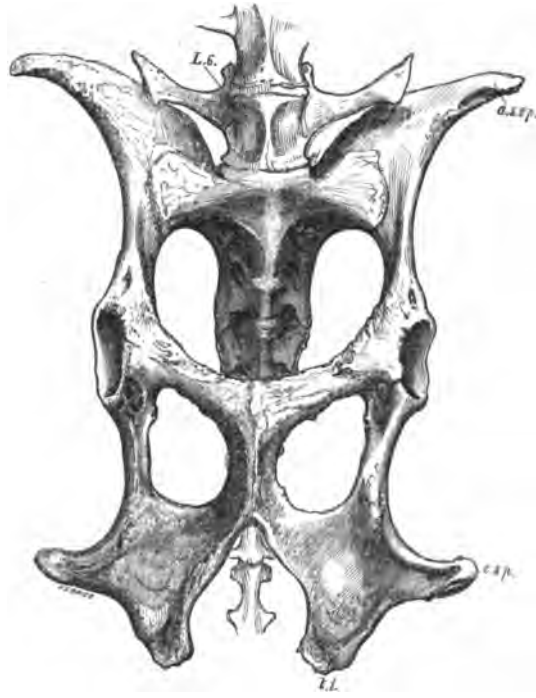
The unciform, like the magnum, has a very smooth under surface, which plays on the proximal end of the fourth metatarsal (*i. e.* the outer one present). The upper surface of the bone is uneven, and possesses several facets at different angles and planes, which articulate with parts of the lunare and cuneiform. That fossa outside, wherein the descending process of the cuneiform lies, is well marked.

The cannon bone is a long and beautifully finished pillar, a slight mesial groove indicating third and fourth metacarpal elements. A nutritious foramen penetrates the bone at either end of the said furrow. A delicate spicular rod of bone 2¼ inches long, and representing a second metacarpal, is seen in the College of Surgeons' skeleton; this must either have been cut away or was absent in the Society's specimen. Behind the digital end of the connate metacarpals are two pairs of large-sized sesamoid bones, each pair appositely placed with a median groove for the long flexor tendons. Futhermore, in the Hunterian specimen three additional free and minute ossicula have been preserved; of these, two are placed on the inner and one on the outer side of the metacarpo-phalangial joint.

The phalanges, proximal, median, and distal, are of fair strength, and, all more or less, laterally compressed. The last or ungual digits are comparatively short and high. Behind the lower extremities of the second phalanges two large sesamoids are met with.

(B) *Pelvic arch and hind limb.*—In treating of the male pelvis it may be as well to mention that the left ischium of the Society's specimen had sustained a fracture, the parts being reunited in a contorted manner. The opposite right pelvic moiety, however, was intact; and from it and the College of Surgeons' skeleton the subjoined description is taken.

Fig. 7.



Pelvis of male adult Saiga, its lower aspect: two-fifths nat. size.

L. 6. Last or sixth lumbar vertebra. *a. s. sp.* Anterior superior spinous process. *t. i.* Tuberosity of the ischium. *e. sp.* External spinous process of ischium.

The brim is placed at an angle of about 50° to the long axis of the lumbar vertebræ. Its conjugate diameters are 3 inches; no marked inequalities exist, so that its roundish outline is complete. The enlarged diamond-shaped blade of the ilium is deeply biconcave without for the deep gluteal muscles; and the sacro-iliac synchondrosis occupies rather less than half of the antero-inner convex surface. A remarkably prominent, elongate anterior superior spinous process (*a. s. sp*) juts outwards; and the middle of the crest has also a noteworthy tuberosity. The acetabulum is narrow, but deep, the notch large but protected by a thick layer of cartilage. The anterior

or superior limb of the os pubis is stouter than the posterior one. The symphysis, roughened and protuberant in front, is continued backwards, carinate; the pubic arch is very deep, narrow, and ∧-shaped. Each obturator foramen is widely subcircular. The body of the ischium is thin, with a very sharp superior (or posterior) border, its spine forming a wide upward sweep in the bony curvature. The combined tuber ischii (*t. i.*) and ramus, flattish below and mesially ridged above, have a reverse plane from the body of the ischium; namely, they are horizontal and widely expanded in a trefoil shape. The inner plate or ramus, the thinnest, joins the pubis; the posterior tuberosity is thick and bulbous; and the third outer spur, which I designate the external tuberosity (*e. sp.*), has an intermediate thickness and breadth. An angle of 75° approximately gives the separate plane between the iliac and the ischio-symphysial axes.

From within outwards the neck of the femur is very broad, but exceedingly short, it and the head being antero-posteriorly flattened. The articular surface of the latter, consequently, is of a transversely oval shape, depressed, and almost at right angles to the axis of the shaft: a roughening indicates the round ligament. The intertrochanteric fossa burrows deeply at the root of the great trochanter, and from that inwards is more open. The great trochanter is large, and posteriorly rises ¼ of an inch higher than the head; its gluteal surface has a long subquadrate outline. Relatively, the trochanter minor is small, and, as in other Ruminants, a third trochanter is wanting. The shaft has a slight forward axial bend; and a long but feebly developed linea aspera descends its whole length on the postero-outer side. The condyles are large and subequal in size; the intercondyloid space narrow and shallow.

With reference to the patella, it is short, stout, and of a nearly equal-sided triangular figure. Its articular surface is but slightly convex. In the fresh condition of the parts the eminence of the outer border is heightened by a wall of cartilage: the prominent ridge thus produced overlaps and grasps the anterior articular rim of the internal condyle, allowing of an upward and downward gliding movement, and preventing luxation from side to side.

The articular crown of the tibia is heart-shaped, but with a deep incision for the tibialis-anticus tendon on its outer border towards the front. This causes the outer, fibular moiety or condyle, which superiorly is the more convex of the two, to be shorter than the inner one; whilst it is also the broader, and has a posterior deep-based margin. The tubercles for the crucial ligaments are well developed. The anterior tuberosity is large, though laterally compressed, sharp-edged; and, from being three-sided and of considerable magnitude above, the shaft narrows and is roundish in its lower two-thirds. The muscular grooves are well marked.

Nothing can exceed the compact interlocking, yet easy, ginglymoid movement devised between the distal articulation of the tibia and calcaneum, all chance of lateral dislocation being prevented by the strong internal malleolar plate and the guard of the external side, which is the inferior fibular segment presently to be spoken of.

The remnant of, or aborted fibula, as in other Ruminants, is represented by a short stalactic process of bone depending from the external tibial tuberosity, and by a small subquadrate-shaped bone impacted along with the tarsal elements at the tibial distal extremity; the latter, as above said, takes the place of an outer malleolus.

The tarsus is composed of five separate bones, and a sixth if the fibular distal appendage or separate tarsal-like end be included. These altogether are not so stout as in the Sheep or Chamois.

The calcaneum is strong, of moderate length and thickness, and somewhat more than usually narrowed in cross thickness. It mainly articulates with the astragalus; but there is a facet which rests upon the upper surface of the cuboid portion of the combined naviculo-cuboid bone, and another for the infrafibular ossicle.

The astragalus has the ordinary Ruminant type, but relatively is of small size, though its ligamentous pits and impressions are deepish. Its distal articulation is chiefly with the navicular portion of the scapho-cuboid.

This combined scapho- or navicular cuboid bone is deep compared with its size. Its upper surface, or face of articulation with the astragalus, is biconcave and considerably scooped out.

The single metatarsal shows little or no sign of segmentation. Like the metacarpal, it is of considerable length, but much the more laterally compressed, or its antero-posterior diameter is the greater. This fore-and-aft depth decreases from above downwards, and at the base or distal end becomes altered, so that it is broader across than from front to back. The upper two-thirds of the posterior surface is fluted; and at the top of the groove there rests a small sesamoid bone. The trochlear or digital articular eminences are deep, but not wide. Two pairs of sesamoid bones, affording pulley-superficies for the flexor tendons, lie behind the distal enlargement.

As regards length, lateral compression, shape and number, the digits and phalanges of the hind foot agree closely with those of the fore foot.

(C) *The limb-structure compared.*—In reviewing the appendicular structures I may, first, refer to the Table which I have drawn up to exhibit the comparative lengths of the limb-segments in a series of Ruminants. (See p. 475.)

Saiga is there placed alongside the Sheep. The numbers attached to the names refer to the individual skeletons in the College of Surgeons' Museum, from which these measurements were taken. A single species of each group may serve for comparison, though of course this implies approximate rather than exact inferences.

With regard to greatest breadth of scapula to its length, allowing the long diameter to be represented by 100, these are as undernoted:—

38·1 Giraffe.	59·8 Bull.	68·0 Sheep.
56·4 Goat.	60·0 Saiga.	68·1 Musk-Deer.
59·0 Gazelle.	67·1 Fallow Deer.	69·6 Llama.

These proportions, added to the general appearance heretofore men-

| | | |

tioned, characterize the blade-bone as Antilopine rather than Ovine or Cervine.

It is difficult verbally to define differences in the long limb-bones of animals disagreeing in size but with such similarity of construction as obtains in the subsidiary groups of the Bovidæ. The relation of the segments to each other possibly is the most satisfactory test. From such a standard, in Ruminants generally, the following results appear:—

Proportion of the radius to humerus, the latter equivalent to 100.

89·4 Musk-Deer.	113·0 Fallow Deer.	119·5 Llama.
101·5 Bull.	114·7 Saiga.	128·2 Gazelle.
103·4 Goat.	116·6 Sheep.	209·9 Giraffe.

The Giraffe towers in radial length. The Gazelle, typical of the Antelopes, follows, with, however, great diminishment of the radius, yet considerably removed from *Saiga*, which, with the Sheep and Deer, take an intermediate position in the above Ruminant scale. The aberrant *Moschus* is in extreme from the equally abnormal Giraffe.

Proportion of the metacarpal to radius, the latter equivalent to 100.

68·3 Goat.	81·4 Sheep.	90·9 Giraffe.
69·6 Bull.	82·3 Musk-Deer	98·7 Fallow Deer.
80·0 Llama.	88·5 Saiga.	120·0 Gazelle.

As regards proportion of cannon bone to radius, Sheep and the Saiga again occupy a middle place, and the Gazelle far exceeds these, the Cervidæ, and even the long-fore-legged Camelopard.

Proportion of tibia to femur, the latter equivalent to 100.

92·5 Bull.	111·3 Saiga.	120·2 Sheep.
102·4 Llama.	113·7 Goat.	123·6 Musk-Deer.
108·5 Fallow Deer.	115·3 Giraffe.	128·5 Gazelle.

The Saiga, in its femoro-tibial segments, departs from *Ovis*, and is widely separate from *Gazella*, its alliances, as in the fore limb, being with *Cervus* and *Capra*. The changes in relationship of the Giraffe, Musk-Deer, and Llama are not a little remarkable.

Proportion of the metatarsal to tibia, the latter equivalent to 100.

53·0 Goat.	65·4 Musk-Deer.	83·3 Fallow Deer.
59·8 Bull.	70·6 Llama.	86·1 Gazelle.
61·0 Sheep.	79·5 Saiga.	113·0 Giraffe.

There is a certain correspondence between the cannon bones of the hind and fore limbs, contrasted with their osseous pillar above, in all the Ruminants selected for comparison. The Giraffe, however, presents the maximum, and not the Gazelle.

Limiting my remarks to the Saiga, it comes out, in whichever light viewed, that this animal, in the proportional lengths of its long limb-bones, has much nearer affinities to Sheep than to Antelopes. This with a certainty is the case in the fore leg, though in the hind leg it has closer agreement with Deer than with either of the said groups.

It is necessary to speak with caution of the inferences deducible from pelvic formation, as sex, age, &c. render data unstable, unless an extensive series are studied side by side. The pelvis of the young female Saiga resembles that of the adult female Red Deer; but the adult male Saiga's does not agree with it. The ilia of most Deer are shorter, the pubic angle wider, the brim is not so round, the symphysial ridge and the ischial tuberosities relatively less pronounced.

Sheep contrasted with Saiga have a more oval contour of brim, their anterior superior spinous processes, external ischial spine, and postischial tuberosity are, as in it, large, yet less produced; the pubic angle is narrow and short. A greater differentiation obtains in the Goat, Ibex, and Chamois, where the bony processes are less developed and the pubic angle is wider.

II. Nasal Chambers and Myology.

1. *The Nares.*

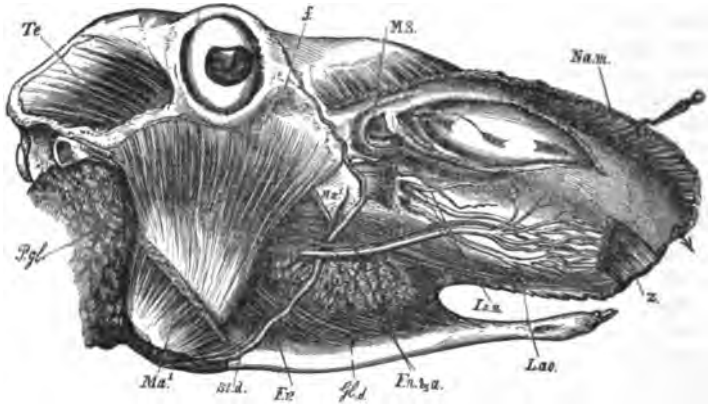
Outer aspect.—The organ, *par excellence*, which first excites attention and gives a peculiar character to the Saiga is its trunk-like proboscis (fig. 12). No existing Ruminant, to my knowledge, is furnished with such an exaggerated nasal apparatus, though some few have the upper lip more than ordinarily elongated. It is, however, to the ample soft narial walls that the Pig-like or proboscidean face is due in Saiga. As in Swine, its extremity is abruptly truncated; but it differs very materially from theirs in being soft and flabby, without a discoid fibro-cartilaginous expanse; and the nasal orifices are very patulous. Neither is the Saiga's nasal enlargement quite after the type of the Elephant and Tapir, where the trunk is provided with a tactile retracting tip. The Horse, again, bears a resemblance to the Saiga in its greatly dilated nostrils, which, however, are more cartilaginous; and its upper lip is much more callous and prehensile.

Externally and in front the nose and muzzle of the Saiga have a semilunar contour, the lip broad, hairy, and mesially grooved, but not deeply fissured. The nares have an extreme transverse diameter of 2 inches, and each is an inch in depth. Each wide nostril is suboval, and, when dilated, inclines upwards and outwards, where it is rather wider than at the septum. This latter exteriorly is moderately thick, but thin interiorly for 2 or 3 inches backwards. The nasal passages are about 4 inches long from the external orifice to the nasal cartilages, 2 inches deep, the width depending greatly upon the contraction of the facial muscles; for the passages themselves are very lax and pliant in the dead body. The accurate Pallas has not passed unnoticed that the floor and outer wall are clothed with longish silky white hairs, and studded with sebaceous follicles, the septum naked, and that there is a peculiar maxillary sac opening within the cavity of each naris.

Nasal sac.—This sac possesses much interest, as helping, with others, to a better understanding of the homology of the Cetacean nasal sacs, which I have treated upon and compared with this else-

where. In the young female the sac and its opening similarly placed (see fig. 8, *M S*) were smaller than in the adult male; but I shall choose the latter for description. It is placed deeply beneath the nasal muscles and tissues, above the premaxillary bone, and vertically under the alar cartilage. It is globular in shape, an inch deep, and with a large vertical ellipsoidal aperture opening into the nasal passage below the anterior inferior margin of the alar cartilage. Interiorly it is lined with an extension of the mucous membrane, and is studded with glands similarly to the hairy portion of the nares. The glands secrete abundantly a sebaceous-looking substance which Pallas says has a rancid goat-like odour; and in this I concur, though in Sheep the smell from the nares is not dissimilar. The inferior turbinal bones and mucous lining narrow the nostril behind the opening of the sac; but it is worthy of notice that a small vertically semilunar depression, ½ an inch long, exists between them outside the turbinal and superior to the orifice of the sac. There is also another much wider fossa or duplication of membrane on the floor of the chamber mesially and in front of the first-mentioned premaxillary sac. In fact, a semilunar membranous fold forms a well-defined step between the raised anterior narial chamber and deeper posterior nares. The soft membranous postseptum is very thick compared with the front part; its vessels are arranged in very numerous obliquely parallel lines.

Fig. 8.



Dissection, head of female Saiga, showing nasal sac and nervous distribution.

M S. Maxillary sinus, or extra nasal sac; a portion of its outer wall is removed, and an arrow from the nares shows the connexion therewith; parts of two other arrows indicate the separate nasal passages. *f.* Suborbital fossa or pit. *Na. m.* Nasal muscles, reflected and partially cut off. *z.* Origin and insertion of zygomaticus. *I. o. n.* Infraorbital nerves. *F. n. & a.* Facial nerve and artery, a dotted line carrying them towards their cranial exit. *P. gl.* Parotid gland; and *Gl. s.* Glandula socia. *F. v.* Facial vein. *St. d.* Stenon's duct. *Ma*¹ and *Ma*². Superficial and deep layers of the masseter. *Te.* Temporalis.

Nasal cartilages.—As has been shown, the lengthened capacious nasal organ of the Saiga is chiefly built up of soft substances, namely muscular, fibrous, and fatty structures, with an internal lining of sensitive, partially hairy, mucous membrane. The cartilages of the nose take but a minor part in its composition. It may be as well, however, that I describe these; and in so doing I refer to figure 5. This will enable the reader to comprehend the relation of the parts at the root of the nose, when the soft nares are removed, the cartilages alone remaining in contact with the bones.

The septum narium (*Sp*) is remarkably long and deep; anteriorly and superiorly it is membranous, the more solid cartilaginous portion, or *septal cartilage*, being limited to a lengthened wedge-shaped splint. This arises from the vomer; trends forwards and downwards on the floor of the nares to the anterior median groove separating the premaxillary bones.

At the summit of the nasal region, above and in front, the septal narial cartilage projects for about an inch beyond the nasal bones. It is narrow and acutely wedge-shaped, the basal end but moderately broad, the point mingling with or being wedged between two elongated fibro-cartilaginous cords (*f*) presently to be spoken of.

The two *upper* and posterior *lateral cartilages* (*Ul*) have each a shallow but widish semilunar contour, and partially fill the irregularly margined concavity betwixt the orbito-maxillary and nasal bones. The anterior horn of the crescent abuts against the median nasal cartilage, and outwardly is bounded by the alar cartilage. The post-infero-horn runs down towards the premaxillary, and by a constricted isthmus joins what appears to represent a sesamoid cartilage, though in strictness this is little other than an inferior continuation of the upper lateral cartilage itself.

The so-called *sesamoid cartilage* (*Ss*) is of small size, narrow, and arciform, and fits into a deepish pit of the bone at the lachrymo-maxillary orifice of the nasal duct, see *, fig. 4.

The *alar* or *lower lateral anterior cartilages* (*Ll*) are the largest and thickest of the three pairs of nasal cartilages. Each possesses an elongated lozenge-shape, or is irregularly diamond-figured. The axis of the long diameter passes in a line nearly parallel with that between the apex of the nasal bones and the inferior border of the orbit, but is fully ½ an inch in front of these. The upper anterior angle of the alar cartilage, as has been intimated, is joined by an anterior slip from the upper lateral cartilage; and the united but produced portion lying outside the point of the superior portion of the septum narium is continued onwards. The pair of narrow cords (*f*), one on each of the median lines, are fibrous in texture and very elastic; and they proceed among the tissues of the summit of the nares, as far almost as the truncated extremity of the nares, laterally dwindling to a delicate film of glistening fibrous tissue. The inferior angle of the alar cartilage is curvilinear, the concavity forward and, broadening slightly below, bends inwards towards the nasa chamber.

It is difficult accurately to define the margin of each of the cartilages as they graduate into thickish fibroid tissue at their free edges. A rough measurement in the male animal gave the following results:—Alar cartilage 2 inches in long diameter by ½ inch at point of greatest breadth; posterior lateral cartilage 1½ by ½ inch in the same diameters, the sesamoid or extension of the last 0·6 long by 0·2 inch at widest.

Separating the alar and lateral cartilages, on both sides of the nares is an elliptical fossa or shallow depression placed almost perpendicularly to the long axis of the cranium. This depression, indicated only by a dark shadow in fig. 5, consists of strongish fibrous tissue, but is filled ordinarily with fatty substance and delicate pale-coloured muscular fibres. These last, as shall hereafter be more particularly pointed out, may be homologous with the levator proprius alæ nasi anterior, and levator proprius alæ nasi posterior, or the true dilators of the nares, although here situated far behind the external narial apertures.

The fibres in question still have the same function in relation to the cartilages of the nose, namely, movement of the alæ. The long fibrous cords conjointly derived from the alar and postlateral cartilages appear to form a superior longitudinal line of support to the soft nasal walls. They, being highly elastic, permit, and indeed assist, the muscular coverings in retracting efficiently.

Sense of smell.—Discussing the parts appertaining to the sense of smell, it here seems appropriate to say a word on such habits of the animal as bear thereon. The nose of Saiga, I find on good authority, is an excellent telltale, as the information my esteemed colleague, Mr. A. D. Bartlett, furnishes me with proves. He says, "One of the difficulties attendant upon keeping the Saiga in good health is its daintiness. Not only is it necessary to find suitable food, but that food must be perfectly fresh and untouched by other animals; for if a mouse, rat, or even a sparrow, feed out of the same trough, or touches the provender, the Saiga will not eat it. So delicate is the sense of its smell, and so carefully must every particle be handled, that I regard it as one of the most dainty feeders I have ever met with among animals during my long experience in these Gardens."

Another circumstance tending to show a keen sense of smell is, that when any disagreeably odorous substance is offered or thrown to the animal it seems quickly to appreciate its qualities. Although its curiosity be excited, it does not approach closely and sniff it, as most Antelopes or Deer would, but remains at a distance inspiring freely with dilated nostrils.

2. *Muscular and other structures of the face and body generally.*

I have explained at length the peculiarities of the internal nares; but the structure of the external walls also demands a few remarks. The soft flabby nature of the proboscis has been alluded to as dif-

fering from that of other animals with a like nasal elongation, as notably the Pig, Horse, and allied Ruminants. The Tapir probably presents the nearest resemblance, minus lengthening and tactile apex; this, as has been shown, is chiefly owing to the shortening of the nasal bones and cartilages. Proceeding, however, with an enumeration of the parts from the superficial towards the deep, I shall state broadly that the muscles, vessels, and nerves closely assimilate in their disposition to those in the common Goat and Sheep; but the development of analogous parts does not quite correspond.

In the Saiga there is a great broad sheet of muscular fibres which arise from the naso-, orbital, and maxillary regions, and, proceeding forwards, clothe the entire surface of the unusually vertically deep nares (*vide* fig. 8, *Na. m*). Posteriorly the fibres are thin, but they acquire bulk as they go forwards and downwards. To the lower border of the above, and, indeed, intimately connected with it, is a narrowed but also thick plane of muscular substance, which springs from the maxillary eminence and goes to the outer inferior side of the nostrils (*z*, fig. 8). Its direction is somewhat obliquely upwards or convergent to the first named. These two muscles respectively correspond to the *levator labii superioris alæque nasi*, and conjoined *zygomatici*. The lower one may also include the *levator labii superioris proprius*, whilst the upper one, in its deep transverse pale-coloured fibres, undoubtedly comprises the homologues of the *pyramidalis nasi*, *compressor naris*, and *dilator naris*.

The last-mentioned three muscles, though most intimately interwoven with the coarser upper layer of the *levator labii superioris alæque nasi*, and in a manner inseparable from it, can yet be readily distinguished, as they are much paler in colour, finer in texture, and set obliquely or at right angles outwards to the narial wall. The alar cartilages, it is true, are situated far back; nevertheless the posterior portion of the dilator naris (or *levator proprius alæ nasi posterior*) is clearly present, filling the deep fissure between the maxillary bone and the curved tapering alar cartilage. The anterior portion of the dilator (*levator proprius alæ nasi anterior*) abuts against the soft walls of the naris. The *depressor alæ nasi*, and so-called *naso-labialis* of human anatomy, cannot be defined.

In the Sheep and Goat the levator labii superioris alæque nasi is very small compared with the Saiga's; and the other deep nasal muscles proper, from the cartilages being carried forwards, are very diminutive indeed in the former animals. The zygomatic and levator labii proprius muscles, however, are coequal, probably even thicker in the Goat, which, as a browser, as Ogilby remarks*, uses its upper lip to a remarkable extent.

The trunk of the Elephant and Tapir, whilst absolutely composed of the same homologous elements, has quite a different appearance when cut into, either transversely or laterally. In them there is a vast accession of prominently marked muscular slips, and glistening interlacing cross fibres intermingled with large blood-

* Trans. Zool. Soc. vol. iii. p. 58.

vessels, which give the whole quite a banded network character; whereas in the Saiga the fibres of the nasal muscles proper and blood-vessels are so minute as to have more of a glandular aspect.

In the Pachyderms the proboscis is as much an organ of touch and prehension as of smell. In Saiga undoubtedly touch or the sense of feeling must be possessed to an unusual degree in this musculo-sensory nasal apparatus. The increase of powers of smell, however, seems to be its office; for the Schneiderian membrane is that which most gains in superficial capacity, the power of retraction and movement, though possessed by it, being secondary or adjunct.

The distribution of nerves to the outside of this dilated nose-chamber is peculiar, inasmuch as the facial nerve (*F.n.*) is enormously developed. Piercing the parotid gland behind the ascending ramus of the mandible, it traverses, as in Sheep and Goats, superficially across the masseter to above the angle of the mouth, then, directed obliquely upwards and formards, splits into a vast number of thick branches. But the fan-shaped nervous plexus which spread over the entire face are by no means so few or so small as in Ovidæ, compared with which they are of gigantic proportions. While some proceed towards the upper lip, the greater number pass underneath the zygomatic and l. l. s. alæque nasi muscles, and, piercing the deep nasal muscles, ramify finally on the fibrous wall of the nares, both laterally and in front. In fact they similate the nervous distribution on the Pig's mobile and sensory snout; only in Saiga many more go to the lateral aspect of the nares, and comparatively fewer to the extremity of the nose. In most Bovines the infraorbital nerves are large relatively to the temporo-facial; but in *S. tartarica* the reverse obtains (fig. 8, *I. o. n*). This may be accounted for by the upper lip of the former requiring greater nervo-muscular power; whereas in the latter, as has been shown, the nose acquires prominence, being the active sensory and mobile organ.

Among cranio-facial muscles other than those mentioned, the *temporalis* (*Te*), as in Ruminants generally, has a small superficial area. The *masseter* is double; its superficial layer (*Ma*^{1}), broad and thick, arises by a strong tendon from the maxillary prominence, and by fibres from the lower edge of the orbit; posteriorly and below it has a wide insertion into the angle of the mandible. The second, deeper layer (*Ma*^{2}) has more vertically directed fibres; they arise from the anterior half of the zygomatic arch and lower surface of the orbit, and are inserted into the anterior half of the ascending mandibular ramus. The *buccinator* is moderately thick, elongated, and narrowed behind. The inferior labial group of muscles are but moderate in size.

The *sterno-mastoid*, as Owen remarks in the Giraffe, is according to attachment a sterno-maxillaris, each belly posteriorly being in close union with the sterno-hyoidei, and anteriorly ending by a strong tendon, which amalgamates with that of the masseter primus, they together being firmly fixed to the maxillary eminence. This facial

attachment must have a powerful influence in fixing the head upon the neck.

The *pectoralis major* is small compared with the *p. minor*; its origin reaches only to opposite the fourth rib; and its broad insertion is round the fleshy parts at the head of the humerus. The *pectoralis minor* is much more elongate, triangular, and stronger than the *p. major*. It extends backwards to the xiphoid cartilage, and, in partial union on the side of the chest with the latissimus dorsi, proceeds forwards, and is inserted into the head of the humerus above the supraspinatus. As in Ungulata, there is a *sterno-scapular* muscle present. This, a small fleshy band or slip, arises from the anterior outer side of the manubrium, and, passing outwards, goes between the scapula and head of the humerus, being lost in the tissues superficial to the pectoralis minor. A distinct *supracostal*, some inches long, lies upon the first four or five ribs, as in many Ruminants. It is fleshy to the second rib, and broadly tendinous behind that, inclining from without inwards. The *serratus magnus* is both extensive, thick, and fleshy. It is situated between the seventh rib and the axis, its subscapular fold covering the bone from the vertebral border to its middle. The *latissimus dorsi* comes from the tenth rib forward, is relatively narrow, and joins, as aforesaid, the pectoralis minor, to be inserted into the humerus.

The *biceps* is single-headed and strong. The *brachialis anticus* has origin from the post-outer surface of the humeral neck, and, with a moderately fleshy belly, is fixed into the anterior radial head. The *coraco-brachialis* is large and fleshy. Origin coracoid process; insertion to middle of humerus. The long narrow *deltoid* stretches between the lower border of the scapula and the deltoid ridge. The *triceps* is four-headed; and there is, besides, a band-like slip representing the *dorsi-epitrochlear* muscle. The scapular head of the triceps is of enormous bulk; and the dorso-epitrochlear band lies deeply adherent to it. The *supraspinatus* has a partially double insertion on to the head of the humerus, as in the Giraffe.

There is the representative of a *cephalo-humeral*, which rolls round the head of the humerus, and is inserted between the biceps and brachialis anticus and triceps on the shaft of the bone below the deltoid ridge. The long spinal muscles of the back are remarkably broad, well developed, and fleshy; the *psoas* and *iliacus* moderately so, though wide.

There is a thick layer of firm fat overspreading the entire body, but only partially so on the limbs; it lies beneath the extensive muscular panniculus carnosus. The cutaneous *panniculus* is of moderate thickness, and fleshy chiefly on the side of the body. It sends a thin slip towards the elbow; and there is a broad attachment, both into the groin and onwards to the knee-joint.

Other muscles have been described, among the organs of generation and laryngeal structures. The remainder of them and the tendons of the limbs were but roughly dissected, as both skeleton and skin had to be prepared for the British Museum.

III. Visceral Anatomy.

1. *Vascular Channels.*

The heart, 4 to 4½ inches long and 2½ inches in diameter at the base, approaches more to the Antelopes' and Deer's in shape than to that of the Sheep. This arises from its being elongate, pyramidal, and taper pointed; for in the Sheep the apex is more blunt and obtuse. The deposition of fat around the basal end and on the pericardium is limited in quantity. A thin ossicle an inch long and ·2 inch broad at its middle, lay within the muscular substance, close to the aortic orifice, in the adult male. The bone, as regards shape, was not unlike a diminutive broad first rib, one end being wider and twisted, like the costal head, the opposite extremity narrower.

Fig. 9.



Bone of the heart—nat. size.

A single superior vena cava and an inferior one enter the right auricle from above and below. The facial veins and arteries (see fig. 8) follow the distribution met with in Bovidæ generally.

That vasculo-glandular reservoir the spleen, as Pallas shows (*l. c.* p. 43, tab. iii. fig. 11 *e*), is adherent to the left upper side of the paunch, a couple of inches from the cardiac orifice. It is flat and broad, some 6 by 4 inches in diameter.

2. *Genito-urinary Apparatus.*

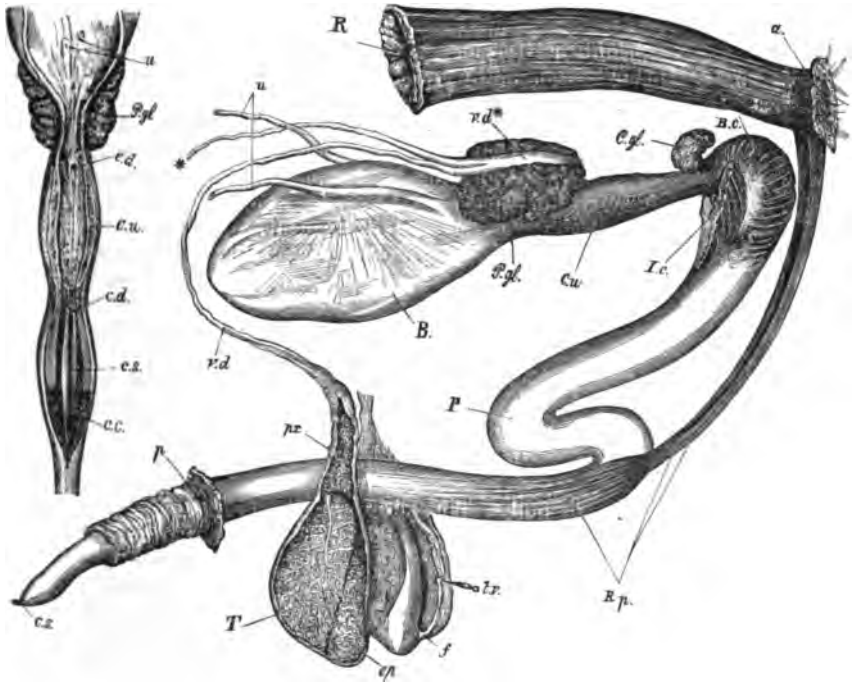
In the female the clitoris, the vagina, and the bicorned uterus, present no special features worthy of notice. The specimen examined, a young half-grown animal, had imperfectly developed mammary glands, upon which were four teats.

In the male Saiga, Pallas curtly adverts to the testes, penis, and its præputium; but he omits reference to the prostate and Cowper's glands, which are present. (*Vide* fig. 10.)

The scrotum is subglobular, and rather sessile than pendent. As Pallas observes, it is large—in the adult examined by me, equalling a small orange in size, and exteriorly covered by short white hairs. A considerable quantity of firm fat is imbedded within the scrotal sac, being deposited in greatest quantity at the root of the testes and around the cord. It forms indeed a septal division between the glands, and gives bulk to the scrotum.

The cremaster muscle is developed as a broad band descending as low as to opposite the globus major. The strongly fibrous tunica vaginalis (*t. v.* reflexa) is semitranslucent; its visceral portion (t. vag. propria) is still more delicate, and the lower uniting fold (*f*) situated about ·4 inch from the inferior end of the globus minor.

B. Fig. 10. A.



Reproductive Organs of the male Saiga.

A. Reduced sketch of a dissection of the parts, bearing somewhat their natural relations. *R.* Rectum. *a.* Anus. *T.* Left testis mesially bisected; the right is partially shown with its sac reflected. *ep.* Epididymis at globus minor. *t. v.* Tunica vaginalis dragged backwards; gyri of the spermatic vein are delineated upon the testicular surface. *f.* Fold between t. v. propria and t. v. reflexa. *px.* Plexus of spermatic vessels. *v. d*, *v. d**. Vas deferens; the right tube * has been severed. *B.* Bladder in its contracted condition. *u.* Ureters, cut short. *P. gl.* Prostate gland. *C. gl.* Cowper's gland. *P.* Penis, its sigmoid flexure. *p.* Præputium, retroverted. *c. s.* Terminal lip of the corpus spongiosum; the urethral orifice opens at its point. *R p.* Retractor muscles of penis. *B. c.* Bulbo-cavernosus. *I. c.* Ischio-cavernosus, cut from its bony attachment. *C. u.* Constrictor urethræ.

B. Segment of the urethra and bladder opened from above. *u.* Orifices of the ureters. *P. gl.* Prostate gland. *c. d.* Ejaculatory ducts. *C. u.* Constrictor urethræ muscle seen in section. *c. s.* Corpus spongiosum. *c. c.* Corpus cavernosum. *c. d.* Cowper's ducts.

Each testicle, with its globus minor, is egg- or, rather, spindle-shaped, and measures 1¾ inch long by 1 inch in broadest diameter. The body of the epididymis is broadish and band-like, the globus major and minor both being of considerable dimensions. The latter (*ep.* fig. 10) descends ¼ of an inch below the gland, and is back-

wardly protuberant. The white fibrous septum known as the corpus highmorianum, is linear, rather indistinct, and occupies the mesial axis. Owen † remarks of the Giraffe, where the septum is similarly situated, that, as in the Deer and the Antelope, it thus more readily permits of the expansion of the tubular structures in the rutting-season.

The sigmoid flexure of the penis (*P.*) occurs rather behind the middle or the organ. There are two strong band-shaped retractores penis (*R.p*) fixed in front of the bend; but delicate fibres are carried beyond, as a membranous-looking sheath. The præputium (*p*) is attached by a frænum 2 inches behind the point of the penis. The attenuated glans has an inferior oblique papillar extension of the corpus spongiosum (*c. s.*), which terminates in a minute orifice, the meatus urinarius.

Combined bulbo-cavernosus muscles (*B. c.*) produce a swelling almost as large as a chestnut. Each ischio-cavernosus (*I. c.*) is large and fleshy. The continuous thickish layer of the circular and oblique muscular fibres of the constrictor urethræ (*C. u.*), 2½ inches long, form a powerful sphincter.

Two Cowper's glands (*C. gl.*), each as big as a bean, but pedicillate, are situated on the rectal side of the urethra, and immediately behind the root of the bulb. They are yellow-coloured, moderately firm, and separated from each other by fatty and fibrous tissues.

The vasa deferentia (*v. d**.) at the upper end of the neck of the bladder approximate, enlarge considerably, and form a thick, smooth, flattened, elongate mass, which fills the superior fissure between a pair of large glands. These glands, as I have noticed in the anatomy of the Prongbuck, may either represent prostate, vesiculæ seminales, or both. Considered as the homologue of a bifid prostate (*P. gl.*), they each are 1·2 inch long, ·7 inch deep, and together have a breadth of 0·8 in front, and 1·2 inches behind. In side view they are kidney-shaped, with an inferior mesial indentation. From above, including the enlargement of the vasa deferentia, they are somewhat quadrate, narrowing slightly in front. Their surface is smoothish, with the exception of the indentation above spoken of. A nipple-like process from the vasa deferentia pierces the compressor urethræ behind; and the combined secretion of the testes and prostate enters the urethra by a double orifice; ejaculatory ducts (*e.d.*) behind the middle of the membranous portion of the urethra.

The kidneys agree with the characters assigned them by Pallas, namely, subglobularly oval, a shallow hilus, and unsymmetrically placed in the loins. As he observes, the right one lies near the last rib, whereas the left one is much nearer the ilium. Both, in the male Saiga, were enveloped in a large mass of suety fat. They are smooth-surfaced, without lobulations. The cortical substance is unusually thick; and the single deepish sinus has some half dozen undefined pyramids and infundibula. In the male each kidney measured 2·8 inches long and 1·6 across.

Pallas notes that the suprarenal bodies are oblong or oval, green-

† Trans. Zool. Soc. vol. ii. p. 239.

ish-yellow, the right placed on the summit of the kidney, the left nearer the hilus. In one specimen only could I dissect them satisfactorily; and in this they were slightly separate from the kidneys.

3. *The Alimentary Canal and Accessory Glands.*

The œsophagus, 15 inches long in the female and 22½ in the male, has its cardiac orifice opening into the paunch, as obtains in most ruminants; though *Hyomoschus* * and *Tragulus*† offer exceptions in its directly communicating with the reticulum. Pallas has figured the four-fold stomach of *Saiga tartarica*, and beside it has placed for comparison that of the *Antilope gutturosa*. His description of the former agrees in most particulars with what I have found, though, as might be predicted, his rigid measurements do not quite accord with my different-aged specimens.

I may reiterate that the paunch is capacious, and bifid at its greater curvature, the reticulum of moderate size, the psalterium is comparatively small, and the abomasus of fair dimensions.

It may further be noted that the cuticular papillary villi of the paunch are short and club-shaped. The cells of the reticulum are of moderate depth, with rudiments of stellate septa within. The folds of the psalterium correspond with Pallas's description, as do the plications of the abomasus.

The same authority mentions that in the abomasus there are often found woolly balls incrusted by a blackish tartar, as in the Sheep. But no such foreign substance was present in the digestive cavity of the Society's two specimens.

In our Proceedings for 1865, p. 262, Dr. Edwards Crisp makes the following statement:—"I supposed, until recently, that only the Camelidæ had water-cavities in the stomachs; but on dissecting an Antelope from Siberia, the Saiga (*Antilope saiga*), I was surprised to find two large water-bags in the rumen." Unfortunately my eye did not catch this paragraph until I had thrown away the said portion of the viscera of both animals. But I avow that I cut up in each Saiga the stomachs throughout their entire course, and aver that neither my assistant, who was present, nor myself detected such a structure. Pallas, whose opportunities were numerous, and who carefully describes the interior of each cavity of the stomach, does not allude to any such remarkable disposition of the parts.

Having great faith in Dr. Crisp as a careful and conscientious observer, I felt it but justice to communicate with him previously to reading this paper. He has been kind enough to reply to me, and as respects the above says, "I cannot find the paper of the dissection of the Antelope, nor can I lay hands on the dry preparation of what I supposed to be water-bags in the paunch; but I give you the size on the other side [alluding to a sketch enclosed]. These may be abnormal from a lesion, or some other cause; and if it is the

* Flower, P. Z. S. 1867, p. 957, & fig. 2.

† 'Sur la famille des Chevrotains,' Monograph by M. Alphonse Milne-Edwards: Paris, 1864.

Saiga, and you have found no such protuberances, such is probably the explanation. However, I am not quite sure as to the species of Antelope: I think Mr. Bartlett had some doubt about it."

In the well-conditioned male, as in Pallas's specimen, the mesentery was loaded with fat, which in great part covered the stomach and the convolutions of the gut.

As regards the extent of the intestinal tube, it is best expressed in the subjoined tabular view.

	Zool. Soc. specimens.				Pallas's ♂ spec.	
	ft.	in.	ft.	in.	ft.	in.
Small intestine.. in the ♀	33	2	37	7	39	10
Cæcum ..... „ „	0	12	0	9½	0	12·8
Great intestine .. „ „	15	4	17	11½	16	5

The lesser gut is throughout narrow. There is no ileo-colic sacculated gland as in the Giraffe; but the ileo-cæcal orifice has a broadish valvular fringe. The cæcum is simple, and neither it nor the colon is provided with longitudinal fibrous bands. Close upon two and a half feet of the cæcal appendage and the great intestine have a diameter of about a couple of inches; the remainder of the tube is of moderate calibre, with a very slight widening towards the rectum. The intestines describe gyrations and are spirally coiled.

My admeasurement of the intestines do not accurately coincide with those of Pallas; but this may be accounted for by variation in the animals' ages, or, mayhap, by reason of one being wild, the other confined and fed differently. Assuming that his observations and those of Cuvier* are correct, the intestinal tract is nearly equivalent to similar-sized Antelopes' and disagrees with that of the Sheep.

Entire intestine exceeds the body in length:—13·1 times, Stag; 13·6, *Saiga*; 14·9, *A. cervicapra*; 15·0, *A. gutturosa*; 28·1, Sheep. The small intestine is in excess of the great:— 1·4 times, Stag; 2·3, *A. gutturosa*; 2·6, *Saiga*; 2·7, *A. cervicapra*; 3·3, Sheep.

The Sheep-like liver is transversely broad, almost destitute of incisions; what answers therefore to a large left lobe is medianly imperfectly defined. The slight median notch and its round ligament are close to the fundus of the gall-bladder, thus cutting off from its due share of the anterior border the homologue of the lobus quadratus; the latter is moderately wide and triangular. The bayonet-figured caudate lobe is four inches long, and extends freely beyond the right border. A lobus Spigelii is but scantily developed. The relative diameters of the liver in the male Saiga were 10 inches transversely and 6 antero-posteriorly, in the younger female 8 and 4½ inches respectively. As in the Bovidæ, the hepatic substance is soft, finely granular, and smooth-surfaced.

The short roundish gall-bladder is of moderate dimensions, its fossa small and shallow; the fundus, as in *Bison americanus*, reaches quite beyond the free border of the liver. The cystic duct and

* As given by Meckel, Anat. Comp. vol. viii. p. 446. Meckel's estimate does not correspond with the above data calculated from his table.

ductus communis choledochus are both narrow, and together over 3 inches long. The latter opens slit-wise into the duodenum, 7 inches (Pallas notes 10) distant from the pyloric orifice.

The pancreas and mesenteric glands present nothing worthy of notice.

4. *The Mouth and Organs of Deglutition.*

In the 'Spicilegia' quoted, the hairy upper lip, premaxillary pad, conical papillary fuscous buccal region, and livid tongue are briefly mentioned. I may add, however, a few remarks. There are a dozen forwardly convex linear and fringed transverse palatal elevations; behind these the surface is smooth and somewhat concave from the second molar backwards.

The dark coloration of the tongue is limited to its anterior half or that portion capable of being extended; the posterior moiety, on the contrary is very pale-coloured. In the male the gustatory organ was 6 inches long, and within a trifle of $1\frac{1}{2}$ inch broad at root. In general appearance it is uncommonly like that of a Sheep, much more so than to an Antilope's tongue. The root is thick and convex, the middle considerably narrower; and forwards from this it by degrees widens into a broad flat spatulate extremity. The tip is slightly notched in the median line; and from this a shallow furrow runs back for $1\frac{1}{2}$ inch. Below there is also a very shallow medial furrow $\frac{1}{2}$ inch in length. From the frænum linguæ the tongue is free for $1\frac{1}{2}$ inch. Between the tip and the anterior portion of the dorsum the surface is comparatively smooth, the filiform papillæ being very short, close, adpressed, and towards the posterior portion retroverted. Each lateral margin of the dark portion of the tongue, and an arch $\frac{1}{2}$ an inch deep underneath the tip, are beset with punctiform flat-topped papillæ fungiformes. The conical papillæ on the white convex dorsum are of moderate size, and, as in the Sheep, form a longitudinal ellipse. The papillæ circumvallatæ are few in number, of small size, and sparsely scattered in parallel longitudinal rows on the external surface of each side of the dorsum and root.

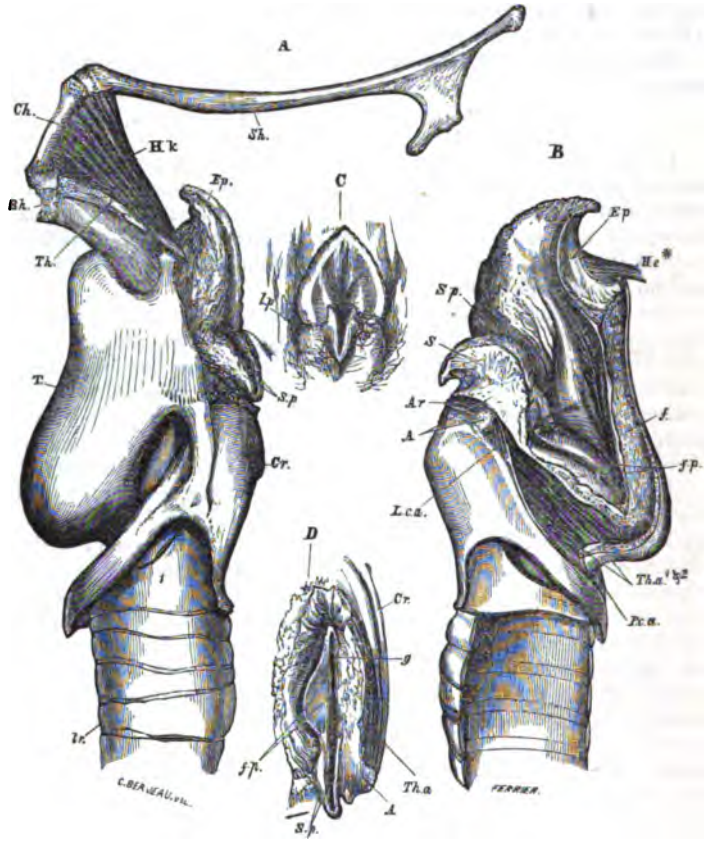
The Saiga being a delicate feeder, choosing, like the Goat, aromatic herbs, may account, physiologically, for vast numbers of gustatory papillæ found at the sides and under surface of the tip of the tongue.

The velum pendulum palati is a thick and deep fold, narrowing considerably the passage into the pharynx. The arch above is dense and muscular; but the free margin is much thinner and membranous. The two small follicular tonsillary glands are hidden within the pillars of the fauces; and open into the palatine arch by a narrow orifice in front of the epiglottis. The mucous membrane around the fauces is smooth.

The pharynx is a much wider cavity, and is abundantly supplied with submucous glands: its constrictor muscles have but moderate thickness.

Of the glands conveying their secretions by ducts into the mouth,

Fig. 11.



Larynx and Hyoid of the adult male.

A. Profile view of the outside. *T.* Thyroid ala, showing its inferior gibbosity. *Cr.* Cricoid cartilage. *tr.* Trachea,—1 marking its first, broader ring. *Ep.* Epiglottis. *S.p.* Projections over cartilages of Santorini; the arrow above indicates the upper laryngeal aperture. *Sh.* Stylohyal. *Ch.* Ceratohyal. *Bh.* Basihyal. *Th.* Thyrohyal. *Hk.* Hyo-keratic muscle.

B. Larynx dissected, the side of the thyroid cartilage and tracheal rings removed. *Ep.* Cartilage of epiglottis. *Hes.* Portion of the hyo-epiglottic muscle. *f.* Fat, and *f.p.* fatty projections on sides of glottis; the arrow points to aperture of the last. *Th.a.* 1 & 2. Lower and upper thyro-arytenoidean muscles. *P.c.a.* Part of the posterior cricoarytenoideus. *L.c.a.* Lateral crico-arytenoideus. *Ar.* Arytenoideus muscle, and *A.* artytenoid cartilage. *S.* Cartilage of Santorini. *Sp.* Projection of Santorinian cartilage and fatty tissue.

C. Pharyngeal view, epiglottis and superior aperture of larynx. *l.p.* Exterior laryngeal pouch.

D. Partial dissection, displaying from above the false vocal cords and chink. *Cr.* Segment of the cricoid. *A.* Upper view of arytenoid cartilage. *S.p.* Projections of cartilage of Santorini on one side, and fatty covering on opposite moiety. *f.p.* Anterior fatty prominences bounding (*g*) fissure of the glottis; the tissue on the left side has been cut off.

the parotid (fig. 8, *P. gl.*) needs be mentioned, as of very large size, wide, flat, and coarse in texture, as, indeed, is the case throughout the larger Bovidæ. Stenon's duct (*St.d.*) is capacious and long, curves round the mandibular angle in company with the facial vein (*F.v.*), dips into the cheek-tissues, and finally opens by a papillary orifice close behind the angle of the mouth. In the Common Goat Stenon's duct opens much further back in the mouth. There is a small flat glandular mass (fig. 8, *Gl. s*), spread thinly upon the surface of the buccinator muscle, and entirely separate from the parotid, though in connexion with the Stenon's duct. This buccal gland may be the homologue of the so-called *socia parotidis* in Man, here thrown considerably forward, and quite isolated from the parotid itself. The submaxillary gland appears closely commingled with the parotid. The sublingual gland is well developed, lies in the usual situation alongside the tongue, and is very elongate, corresponding with the shape of the latter organ.

The large dimensions of each and all of these salivary apparatus is not peculiar to the Saiga; for, as is well known, in the whole of the ruminants it attains considerable volume.

5. *Vocal and Respiratory Tract.*

When the pharyngeal wall is cut through and reflected, the upper laryngeal parts present the following aspect (*vide* C, fig. 11):—The aryteno-epiglottic folds are large, and lie outwards, giving breadth to the deeply excavated laryngeal opening. The glottis is an elongate arrow-headed fissure, wide in front and narrowed behind. The posterior floor or basal end of epiglottis has two parallel longitudinal narrow ridges, which descend towards the rimal aperture. Outside the aryteno-epiglottic folds and between them and the thyroid cartilaginous alæ are deep and wide cavities (exterior laryngeal pouch, *l. p*), the posterior ends of which curve inwards. Bounding the narrowed hinder end of the glottis are two long narrow membrano-fatty projections, which unite behind and thus form a compressed V-figure; these (lettered *s. p*, in cuts A, B, D, fig. 11) are eminences produced by thickened tissues surmounting the upper border of the cartilaginous plates of Santorini, or, possibly, combined with these cuneiform cartilages. With its side folds, the epiglottis looks full, is somewhat triangular in outline, and less than an inch in its diameters.

A deeper dissection of the upper laryngeal cavity, as in the side view B and upper view D, shows that this is capacious, and that the walls, both laterally and in front, are padded with fatty matter (*f*). This, with its mucous lining, forms numerous thick longitudinal folds; and quite in front is a sulcus, which, descending, leads into a small pouched cavity within the depending globosity of the thyroid cartilage. This recess, hidden by the folds spoken of, is slightly locular or gland-pitted within. The chink of the glottis (*g*), commencing immediately behind this pouch, has an antero-posterior diameter of 2 inches. Its anterior half is bounded by two consider-

able-sized ploughshare-shaped fatty projections (*f. p*) meeting in front. External to each fatty mass there is a deep furrow which tends forwards to the anterior thyroid saculus. The posterior half of the laryngeal aperture is walled by the Santorian cartilages (*S*) and adipose coverings (*s. p*), the aryteniod cartilages flanking these.

There are no lateral sinuses or ventricles other than those described.

The adjoining lips of the rima glottidis forming the true vocal cords are continued down from the fatty eminences for the depth of an inch, and are set at an oblique angle, parallel with, but above the anterior ring of the cricoid. They are smooth-surfaced, and, in the relaxed condition of the parts, approximate, leaving but a narrow fissure. The aperture behind them, at the arytenoid and Santorini cartilages, is a trifle wider; and from these the inferior cavity of the larynx descends as a funnel between the vocal cords, the posterior cricoid shield, and the expanded hinder arch of the uppermost tracheal ring, to the large tracheal passage itself. Thus, as in *Hyomoschus**, there is a partially cylindro-tubular passage behind, more or less divided by the thrust-forward vocal cords from the anterior or upper thyroid chamber.

Cleared of superincumbent tissues, the thyroid cartilage (*T*) exhibits two thin but broad and long lamellar alæ, and, besides, a median and very remarkable enlarged gibbosity. This salient inflation inclines towards, but does not reach, the anterior cricoid arch. The thyro- and crico-hyoid muscles do not cover it, the inner border of the former filling a shallow valley on either side. There is a shallow median notch at the anterior border of the cartilage.

Each anterior cornu is about ½ inch long, moderately narrow, and composed of thin translucent fibro-cartilage. The posterior cornua are much stouter and twice the length of the preceding. The upper and lower cornual appendages are situated in a line with each other, though widely apart, and directed contrariwise. At their inner roots the thyroid border is widely emarginate, the lower deeply so, through which passes the cricoid ring and crico-thyroid muscle. The entire surface of the thyroid cartilage is smooth and with no defined oblique line. In extreme length it is 2½ inches, and its greatest diameter 1·8 inch.

The cricoid (*C*) is much the stronger cartilage. Its posterior surface is carinate, the broad upper border being transversly arched and free from incision; the lower border is thin and terminates in a spatular cartilage. The anterior segment of the cricoid ring descends obliquely from opposite the postthyroid cornu. At first broadish, and then gradually narrowing, it meets its fellow of the opposite side in the form of an inverted gothic arch, which, expanding, overlaps the first and partly the second tracheal rings. The postero-cricoid shield is 2·1 inches long, and 1½ inch broad, and each moiety of the anterior ring is a couple of inches in length.

Each arytenoid cartilage (*A*) is about 1 inch long, and, attached by a joint to the upper and outer angle of the cricoid shield, passes

* Flower, P. Z. S. 1867, p. 957.

therefrom in an oblique line cutting the said point and the thyroid gibbosity. It has an irregular elongate triangular figure, ½ inch broad behind and narrow in front. Its borders and surfaces are more or less concave; and the cartilage altogether is stout, thick, and from 0·3 inch deep behind lessens considerably forwards. At the external cricoid joint there is a considerable-sized nodosity; and the inner superior margin is crescentically ridged and overtopped by the cartilage of Santorini.

The latter (*S*) is a thin falcate lamella of soft yellow fibro-cartilage, some 0·8 inch long, and above 0·3 inch in extreme depth. It forms a crest, as said, to the arytenoid, and is itself covered by a fatty layer, producing those posterior elevations of the postlaryngeal aperture (*s. p*) already dilated on. It may be that these include the cartilages of Wrisberg, which otherwise are wanting.

The cartilage of the epiglottis has a consistence like the last, is of obcordate shape when cleaned of investing membrane, and has a retroverted broader tip than in the Prongbuck.

As regards the structure of the Saiga's larynx, it may be regarded as an intermediate type between the Sheep's and that of some Antelopes and Deer. In *Ovis* we have a rudimentary condition or tendency of the thyroid cartilage to inferior enlargement. This becomes more marked in such forms as the *Gazella dorcas*, *G. rufifrons*, and *Tarandus rangifer*, as Meckel* has noted. In *Hyomoschus aquaticus* this protuberance is increased in dimensions, as Flower† figures, but is not, as he supposes, peculiar to this Ruminant; for, as long ago demonstrated by Pallas, the *Antilope gutturosa*‡ is notorious and specifically named on account of its great thyroid development, which is said, indeed, to produce quite a gular swelling. As figured, this thyroid inflation is several inches in diameter. The single thyroid sacculus contained within, doubtless coexists in these latter forms, as in *Saiga*, thus differing from several of the Pachyderms' and other types, where there are a pair of lateral sacculi. In the Horse, however, there is a similar recess at the base of the epiglottis.

Concerning the voice of the Saiga, if this be studied not purely physiologically, but as a sign indicating affiliation of stock, it is of some interest. The tone and manner of utterance is remarkably like that of a Sheep, to wit, a single full bleat or bay, the shrill treble note of Goats and most Antelopes being markedly varied from that of the above genera. The Deer generally have a more grunting tone, though extensively modified in different genera, as, indeed, also obtains in the Antelope section.

Of the muscles connected with the larynx and its bony arch, the sterno-hyoid and sterno-thyroid, long and fleshy, are united opposite the posterior end of the thyroid gland on the fourth cartilaginous ring of the trachea: here they separate; the former continues in the middle line to the os hyoides, whilst the narrower sterno-thyroid diverges slightly outwards, and is inserted by a short broad tendon into the outer posterior margin of the thyroid cartilage. The crico-

* Anat. Comp. vol. x. p. 604.

† *Loc. cit.* p. 955.

‡ Spic. Zool. tab. iii. fig. 16.

hyoid has the usual attachments, but is very broad, and obliquely directed inwards and downwards or backwards.

The thyro-hyoid is a remarkably long, broad, and thin sheet of muscular fibres: origin, sides of thyroid alæ, exterior to the salient protuberance; insertion, the whole of the basihyal and the thyro-hyal cartilaginous rods. A broad portion of the median constrictor passes on to the thyroid ala beneath it. The stylo-hyoid, fleshy and strong, pierced by the median tendon of the digastric muscle, is inserted broadly into the basihyal. I may note also the presence of a large triangular fleshy muscle, the so-called hyo-keratic of some authors (*Hk*).

The crico-thyroid is notable by the obliquity of its fleshy fibres. These meet in the median line, are attached to the upper border of the cricoid in front, but laterally cover it; ascending backwards, the fibres are inserted into the cricoid margin of the thyroid ala. The posterior crico-arytenoidei (*P. c. a*) are large but thin, and fit the shallow concavity of the cricoid shield. Owing to the oblique downward position assumed by the anterior cricoid ring, only short narrow wedged-shaped fasciculi of muscle represent the lateral crico-arytenoidei (*L. c. a*). Each arytenoideus muscle (*Ar*) is fairly developed, and, as usual, fills the post-concavity of the arytenoid cartilage. The thyro-arytenoidei (*Th. a* & *Th. a.* 1 & 2) are great soft muscular bands imbedded amongst and partially interwoven with fatty tissue. They take origin within the cavity of the thyroid prominence, and, proceeding backwards and upwards, partly covered by the cricoid and thyroid alæ, are inserted into the root and outer margin of the arytenoid cartilage.

The bones composing the complex hyoid arch are each relatively long; but there does not seem to be present such a very elongate fibro-cartilaginous styloid cord as is figured by Pallas in the male *Antilope gutturosa*. In the Saiga, as in it and the Sheep, the basi- (*B h*) and thyro-hyals (*T h*) thoroughly interblend together and constitute a high arch, from the summit of which three short blunt processes spring. The middle one, the strongest and most projecting, is the rostrum of the basihyal; the outer ones, or wing expansions of the bone, give lateral breadth rather than branch forwards. From these the styloform thyro-hyals retrograde. The basihyal is just under 1 inch broad, and each thyro-hyal 1½ inch long. The latter were cartilaginous, the former semiossified in the Society's male specimen. The cerato-hyals (*C h*) have a free articular surface at each end. The epihyals nearly correspond, though, unfortunately, not defined or lettered in A, fig. 11. They each are less than an inch long, their ends swollen and body laterally compressed. The stylo-hyal (*S h*) is fully 3 inches in length, the body slender, but the cranial end expanded into a flat somewhat rhomboidal figure. The upper spur terminates in a small tympanic bulb; the lower spur broadly descends, and, with concave antero-posterior margins, bends forwards in a spine.

Comparing the hyoid of *Saiga* with the Sheep's, it is altogether more delicate, and each bone longer. The spurs of the cranial end

of the stylo-hyal are much shorter and stouter in the Sheep. The Antelopes conform more with *Saiga* in the contour and slenderness of their hyoidean elements, and more so than do the generality of the Deer.

Fig. 12.



Head of the male Saiga in its winter coat. From a drawing made under the author's supervision while the animal was living in the Gardens*.

The trachea, as noted by Pallas, is large. The cartilaginous rings, forty-nine in number, are wide, and do not meet behind, the fibrous

* I am indebted to Mr. Glass, the editor of 'Land and Water,' for the use of this woodblock. Remarks on the animal, by Mr. Blyth, will be found in that publication for 14th December, 1867.

interval being broad. Several of the uppermost rings interdigitate. In front the first one corresponds in width to the succeeding rings, but laterally and behind it expands in a broad triangular form, the anterior or upper margin of which fits into the lower arched border of the cricoid cartilage.

The lungs agree with Pallas's description, the left trilobuled, the right tripartite above, and a large lobe below, with a partial lobule at its upper and inner corner.

IV. Exterior Characteristics.

1. *Form and Integument.*

Without hesitancy I offer testimony to the unusually lucid and succinct manner in which Pallas sets forth his descriptive remarks of the external characters of the *Antilope saiga*; and his illustration of the animal is equally happy. Wolf's coloured lithograph in our 'Proceedings,' 1867, pl. xvii., depicts the species in a different seasonal dress; and consequently the neck has a thicker aspect than in the former author's figure.

It is in the hornless female that one quickly traces Sheep-resemblances, the addition of the erect annulated horns in the male masking or altering the ovine expression. Seen from above, the hornless head is long, and, indeed, rather Pig-like, the ears standing well out, the jaws tapering but slightly towards the broad truncated nostrils. The capacious, patulous, oval nasal apertures are a most remarkable feature in the front view when the head is raised. In the adult male (fig. 12) the prolongation of the nasal trunk is greatest, and there is a thick tuft of long hair springing from beneath the eye and overhanging the cheek, besides a fringe of long hair at the margins of the ear, which heightens the uncouth aspect of the animal.

As regards bodily dimensions, these have been amply given in the table (p. 37) of the 'Spicilegia.' From my measurements of the dead bodies it appeared the adult male stood higher at the withers than at the loins, the reverse being the case in the half-grown female.

A circumstance is mentioned by Pallas which merits attention as affording an inkling of affinity. I allude to the fact that the horns of the Saiga are subject to inconstant abnormalities as regards number. He says (*l. c. p.* 35), "Certis testimoniis consentientium venatorum, quos veraces alias expertus sum, plurium teneo, reperiri interdum succenturiato ad alterum latus minori cornu *tricornes mares*; reperiri æque raro *unicornes*, cornu majori, monstroso varieque torto in media fronte instructos."

Among the Deer it is no uncommon thing to find irregularities or abnormalities in the growth of the horns—for instance, in the production of extra snags or non-development of the normal ones. No Deer, however, to my knowledge, possesses more than two branched antlers or cervine horns proper; nor do I know of any case where

excess of this number has occurred as a malformation. The fossil forms, *Sivatherium giganteum* and others, it is true, may be cited as an exception, as it unquestionably bore two postfrontal palmated antlers, likewise two infrafrontal or supraorbital horns with cores.

Again, among the Antelopes the genus *Tetracerus* is the only living representative normally carrying four well-pronounced and separate hollow horns. But neither in *Tetracerus* nor *Sivatherium* do the two supernumerary horns occupy the position assigned by Pallas to the extra ones of *Saiga*. With the limitation above mentioned the Antilopine, like the Cervine, group present no examples deviating from the common rule of two horns.

It is, I believe, alone the Ovine family of the *Bovidæ* which are subject to great variation as respects the number of horns; and hence among sheep one, two, or as many as six postfrontal horns are not unfrequently met with. Nay, more, there are well-defined breeds of four-horned Sheep wherein two horns are erect and not unlike those of *Saiga*, mayhap less annulated; whilst the second pair are broader, flat, and down and inwardly curved. In this respect, therefore, and in the semitransparency of the corneous texture, *Saiga tartarica* gives indications of family relationship rather with Sheep than with Deer, Antelopes, Goats, or Oxen.

Concerning the structure of the core supporting the horns, this, on being cut into sections, longitudinal, transverse, and tangential, was found to consist of osseous substance neither very cellular nor very solid*. Interiorly throughout almost the entire length of the core were minute parallel and partially interweaving tubuli or pores. These were of greatest diameter towards the base; but it was not ascertained whether they communicated with the frontal sinuses, though from appearances I presume they did so. The external and more solid part of the core is finely grooved.

Between the bony horn-core of Antelopes, Sheep, and Goats, that of *Saiga* may be placed as intermediate, though as regards textural fineness it agrees most with the first mentioned. Colonel Smith's opinion, endorsed by Dr. Gray and opposed to that of M. Geoffroy St.-Hilaire, Cuvier, Latreille, and others, is that *Antilope*, *Capra*, and *Ovis* assimilate as regards core horn-structure, but differ from the *Bovidæ* in the cancellated tissue being of a closer consistence.

The nature of the hairy coat and the manner in which it is annually shed are pertinent as regards affinities.

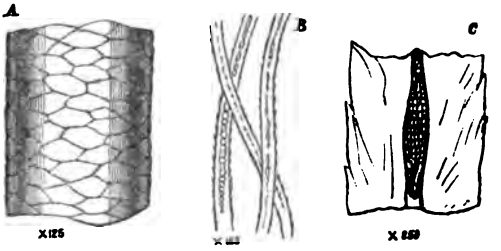
First, it is well known the animal assumes a summer and a winter fleece; that is to say, a periodical shedding takes place. Now this changing of the Saiga's coat occurs differently from what is witnessed in Deer and Antelopes, where replacement proceeds hair by hair, so that no sudden alteration is observed. In Sheep, as is notori-

* The animals examined by me having been disposed of for skeletons, I had no permission to cut into their horns or skull; but through the kindness of Mr. Bartlett an odd horn in his possession was put at my disposal, and sliced as above stated.

ously the case, the fleece annually is pushed off *en masse*, or in great patches, by a more or less uniform fresh growth beneath, and at such times the alteration of appearance is very marked. The Ovine fashion is that which *S. tartarica* follows.

Secondly, the hair of the Saiga has the inherent quality of felting. This property, opposed to its comparative absence in Antilopidæ and Cervidæ, is conspicuously prominent in the whole of the Ovidæ. The tenuous underwool (fig. 13, B, C) which works out in flat masses, weaving and binding together the coarser fibres (the process of felt), is not so fine and delicate as in some ruminants, *e. g.* the Prongbuck; but its cohesive wool-properties are undoubted.

Fig. 13.



Microscopical structure of the Hair and Wool of the Saiga.

A. Portion of a hair-shaft, showing the large cellular medulla and thin cortical layer.
B. Magnified view of wool; and
C. Portion of the same under a higher power, displaying the central cavity and pith-cells.

Thirdly, very critical evidence of the consanguinity of *Saiga* to *Ovis* is shown in the microscopic constitution of the hair. Indeed in this respect it would appear to have affinities or leanings more towards the Cervine than the Antelope type. The finer filaments, or wool *sui generis*, need no further mention; but the thicker brittle fibres, or true hair, have relatively and absolutely a very thin cortex, whilst the medulla is composed of unusually large cells, somewhat hexagonal in contour, though with evident tendency to a transverse wide ellipse (fig. 13 A). These characters cling to the hair of all Sheep, and gradate towards the rather smaller-sized, many-sided, cellular structure of the Deer's hair. In the Antelope group, *A. cervicapra*, for example, the cortex is much thicker, the cells extremely small and so compressed that under low powers they seem as if but transverse striæ. The hair of the mountain-loving Chamois, however, is well nigh identical with that of *Saiga*. The Goats have hair which may be said to stand midway between the Antelope's and Deer's, inasmuch as the cells are of diminished size, oval, but considerably compressed in the long direction of the hair; the cortical layer, moreover, is dense.

Amongst habits peculiar to the Saiga, and which in some senses

appertain to the external characters of the animal, are its modes of progression, defence, and attack. As Mr. A. D. Bartlett and myself have noted, its walk is sedate and steady; but when frightened or pursued, it alters its step and springs with a series of bounds in a vaulting manner. This movement is very different from that of Deer or Antelopes (except in few instances), which trot or canter, two feet touching the ground at the same time, according to the pace adopted; whereas, like mountain-Sheep or Goats, the Saiga jumps elastically, all fours leaving the ground at once. The ischiatic nerves of the last are of immense calibre; but whether this might be adduced as a physiological evidence of the above habit I will not pretend to say.

Pallas appears to think that the ample larynx and respiratory organs sufficiently account for their great swiftness, and quotes Cook * in proof of their speed. The latter says they are the finest runners he ever beheld, at first outstripping a greyhound, though not holding out so long: their feet seem scarcely to touch the ground.

When Deer fight they run against each other forcibly or tilt their horns in a scooping manner. Antelopes use their horns, or charge with a jerking movement of the head. Goats rear and strike downwards. Cattle toss, gore, or bruise with their head. The clashing butt of Sheep is notorious, as any one is cognizant of when two rams fight. They rush backwards, and by a run gain impetus, and smash head onwards with fearful violence. I have myself witnessed more than once an animal killed outright by the shock. The Saiga, as far as the above habits are concerned, is a true Sheep, and not at all an Antelope.

2. *Cutaneous Glands.*

It is well known that the Ruminantia possess cutaneous secretory structures in various parts of their body. The most obvious of these are the suborbital glands. Another series, either found on two or on all four feet, are the interdigital sacs; whilst yet others, of more inconstant presence and significance, are found in the dermal substance of the groin, on the tarsal segment of the limbs, or on the back of the head and rump. This subject has received attention from Jacob †, Owen ‡, Colonel Hamilton Smith §, Hodgson ‖, and others; but the most critical digest is to be found in the masterly Essay of the Society's late and learned Secretary Mr. William Ogilby ¶.

In both the male and female specimens of *Saiga tartarica* examined by me I have found, with a partial variation of the con-

* Voyages and Travels through the Russian Empire (Edinb. 1770), p. 317.
† Rep. Brit. Assoc. 1834.
‡ P. Z. S. 1836, p. 37.
§ Griffiths's Transl. 'Règne Animal.'
‖ Journ. Asiat. Soc. Bengal, 1832, and P. Z. S. 1834, p. 80.
¶ "Monograph of the hollow-horned Ruminants," Trans. Zool. Soc. vol. iii. p. 33.

culiarly its own, it, at the same time, as the comparison already entered into has shown, deviates in several characteristics from the genus *Gazella*, as indeed it does from all modern *Antilopidæ*. Still though endowed with a basis of Ovine construction, it sheers off from this group and engrafts itself with the Antelopes. Over and above it reverts to those strange ancient Deer-like forms of the Tertiary epoch, though isolated from the recent Cervi, not excepting the abnormal-nosed Elk.

The vertebral column is neither strictly that of an Antelope or Sheep, but a mixture of both, with a specialized atloid transverse process. The pelvic arch in the male is nearest allied to that of the Ram, the scapula to the Antelope's. In relative lengths of the limb-bones the fore extremities range with *Ovis*, the hind legs with *Cervus*; but in fineness of symmetry they have more a Gazelle aspect.

Skeletally there are shades and grades of various groups of Bovidæ intermixed, truly one of Parker's "generalized forms," so interblending by structural ties of families otherwise removed, that old taxonomic lines of demarcation are resistlessly swept away.

All the habits of *Saiga* are consistent with those of a Feral *Ovis*. As to the fleece, taken in all its bearings, it does not belong to the Gazelle group nor Antelope proper, but essentially is a slightly modified species of Sheep's wool. I should say of the interdigital sacs, crumen, and knee-patches, that they, in this case, hardly afford satisfactory grounds to base affinity upon. The remarkable internal nasal or maxillary sinus, besides the nasal enlargement, nevertheless leads on apace to Pachyderms, where, as in the Tapir, such maxillary sacs, elongate cartilages, and modified proboscides obtain. The fact that there is abundant fatty deposition, in the fleshy structures outside the body as well as viscerally, and in the scrotum, is in favour of Ovine affinities; in most Antelopes, and universally among Goats, fat is developed meagrely on the body and omentum, being chiefly found *en masse* surrounding the kidneys.

The relatively elongate heart is that of an Antelope or Deer; and the intestinal length conforms with these rather than Sheep.

The final result of all the evidence which can be gathered from the anatomy of the singular *Saiga tartarica* leaves still doubts regarding the creature's place in any one of the *present groups* of the *Bovidæ*. It cannot be said to be purely an Antelope, though in many particulars it announces alliance with the genus *Gazella*, among which, however, I must reject its admission. To the Sheep tribe it is even more related in a variety of characters; yet must it be excluded from either of Gray's Ovine genera (Cat. B. M. p. 160) *Ovis*, *Caprovis*, *Pseudovis*, and *Ammotragus*. Betwixt the above subfamilies or subtribes the Saiga appears to hover, masking under an Antilopine aspect much that belongs to Ovine race. Again relations of no mean kind, whether in a physiological or anatomical point of view, link it with the ancient quadricorn *Siva* and *Titanotheres*.

The non-position, so to speak, of the Saiga among present groups having been established, the difficult task of assigning a location and defining systematic characters for it remains; and here the proposi-

sacculate the glandular portion of the skin of the groin. I am not at present clear regarding its homology; but the better to call attention to the existence of this muscle, I propose temporarily to denominate it the *invaginator sacculi*.

V. Systematic Position of the Saiga tartarica.

When what is regarded among zoologists as an exceptional form, either in a family or genus, is put to the crucial test of anatomical detail, it is oftentimes hard to assign the creature a definite place, even when in possession of the more complete data. Such an animal is the Saiga!

The difficulty in this as in similar cases springs mainly from two causes. One is the value to be attached to any single character or set of characters; for upon this point the most conflicting views are entertained equally among the younger school of naturalists and among the older authorities.

The other cause arises out of the circumstance that in most species such as that under consideration we have what the indefatigable embryologist Parker very deftly expresses in birds as "a generalized form," moulded akin to no special group, but, as it were, a combined patchwork of varied structural organization.

The characters assigned by Pallas (*l. c.* p. 14) in his analysis of the genus *Antilope* * are, "*Ant. saiga* (cornibus distantibus, lyratis, pallido diaphanis, naso cartilagineo ventricoso)."

Setting aside older and subsequent authors, I may mention that Dr. Gray †, with the addition to the above definition of its crumen (suborbital gland), distinct and soft fur, generically subdivided *Saiga tartarica* among the "Antelopes of the Fields" in his synopsis of the Bovidae. Mr. Turner ‡, in grouping the hollow-horned Ruminants from a study of their crania, unfortunately did not see a skull of *Saiga*. Provisionally, from the shape of the horns, that able anatomist placed it under *Gazella*, though animadverting upon Gray's generic separation because of their pale colour. The reply of the latter (Cat. B. M. 1852, p. 51) sufficiently answers the objection. This translucency of the horns, moreover, has even greater significance than their lyrate, annulated character, and, together with their occasional multiple number, decidedly evinces affinities to the Ovine type. Doubtless in size, shape, and position they conform to the Gazelles. So far, therefore, as outward aspect is concerned, they belong to the Antelope section, but not necessarily so; for in the four-horned breeds of Sheep, and even in some of the two-horned varieties (*e.g.* the Wallachian Ram), these organs to a certain extent assume the said peculiarities.

When the skeleton comes to be considered, the skull, as rightly interpreted by Turner in other Bovidae, affords distinctive marks of its family relationships. Whilst exhibiting structural formation pe-

* See Ogilby's critical remarks thereon, Trans. Zool. Soc. vol. iii. p. 38.

† Ann. & Mag. Nat. Hist. (1847), vol. xviii. p. 227.

‡ P. Z. S. 1850, p. 168.

10. Synopsis of the *Cracidæ*. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.L.S., &c.

Abstract of Contents.

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„ II. History of the group ..... p. 505.
„ III. Synopsis of the species ..... p. 512.
„ IV. Geographical distribution..... p. 541.

Sect. I. *Introductory Remarks.*

In his article on the classification and distribution of the Alectoromorphæ, published in this Society's 'Proceedings' for 1868, Professor Huxley has clearly pointed out the characters which divide the Gallinaceous birds into two divisions, the *Peristeropodes* and the *Alectoropodes*. "In the former division the foot is pigeon-like, the long hallux being on a level with the other toes; while in the latter it is fowl-like, the hallux being short and raised." This difference in the structure of the feet is accompanied by well-marked osteological characters, particularly in the form of the sternum, which Professor Huxley then proceeds to speak of.

The Peristeropodous Gallinæ embrace only two families, the *Cracidæ* and *Megapodidæ*—the former peculiar to the tropics of the New World, the latter characteristic of the Australian region of the Old World, whence it extends into the adjacent districts of the Indian region.

Professor Huxley states that he is unable to discover "any important osteological differences whatever" between these two families; and there can be no doubt that as regards the structure of their osseous skeleton they are very intimately allied. But they are exceedingly different in other respects, particularly in their nesting-habits and general mode of life. While the *Megapodidæ* spend their existence on the ground, and lay their numerous eggs in vast mounds raised for the purpose, leaving them to be hatched out by solar heat, or by that arising from the decay of vegetable matter, the *Cracidæ* are essentially arboreal, only occasionally descending to the earth beneath the dense forests in which they dwell. The latter also are true nest-makers, build these structures upon the branches of trees, lay but few eggs, and perform the duties of incubation like orthodox birds.

In continuation of former papers of the same sort upon the birds of the New World, we have now to offer to the Society a revision of the species contained in the last-named family. This has been founded mainly upon the following collections:—(1) the collection of Messrs. Salvin and Godman; (2) that of the British Museum; (3) that of the Smithsonian Institution, which has been most liberally sent over to us from Washington for this purpose; (4 and 5) those of the Museums of Paris and Berlin, which have been examined by Sclater during recent visits to those cities; and (6) the living collection in the Society's gardens, which embraces twenty-six specimens, belonging to sixteen species. We have likewise

received great assistance, in answers to numerous inquiries and in loan of specimens, from Herr v. Pelzeln, of the Imperial Cabinet of Vienna, from Mr. G. N. Lawrence, of New York, and from Mr. Moore, Curator of the Derby Museum, Liverpool.

Before commencing our synopsis of the species of *Cracidæ* we will say a little concerning the labours of former workers on this group, from the days of Linnæus.

Sect. II. *Brief Chronological Account of the Writings of the Principal Authorities on the* Cracidæ.

(1766.) Linnæus, in the twelfth edition of the 'Systema Naturæ,' establishes the genus *Crax* with five species. Of these, *C. rubra* is the female of *C. globicera*, leaving four valid Linnæan species of this genus. The only Penelopine bird recognized is placed in the genus *Phasianus*. It is *P. motmot*, Linn. (= *Ortalida motmot*).

(1780, about.) In the 'Planches Enluminées,' published about this date, four species of *Cracidæ* are figured, viz.:—

Pl. 86. *Le Hocco : faisan de la Guianne* (= *Crax daubentoni*).
125. *Hocco du Pérou* (= *C. globicera* ♀).
78. *Faisan, le Pierre de Cayenne* (= *Pauxi galeata*).
338. *Faisan verdâtre de Cayenne* (= *Penelope marail*).

(1783.) Boddaert, in his 'Table des Planches Enluminées,' gives the name *Phasianus katraka* to Pl. Enl. 146 (which is *Ortalida motmot*).

(1784.) Jacquin, in his 'Beyträge zur Geschichte der Vögel,' figures two species of *Penelope*, *Crax cumanensis* (t. 19) and *C. pipile* (t. 11). These are both probably referable to the same species, viz. *Pipile cumanensis*.

(1786.) Merrem, in his 'Avium Icones et Descriptiones' (fasciculus secundus, p. 40), establishes three divisions of *Craces*:—(1) *Crax*, Linnæus; (2) *Penelope* (type *P. jacupema*); (3) *Ortalida* (type *Phasianus motmot*, Linnæus). He figures his *P. jacupema*, which is probably = *P. marail*, and his *P. leucolophos*, which is certainly = *Pipile cumanensis*.

(1788.) Gmelin, in his 'Systema Naturæ,' makes no alteration in *Crax*, but adopts Merrem's genus *Penelope* with six species. Three of these are good, viz. (1) *P. cristata*, (2) *P. cumanensis* = *Pipile cumanensis*, and (3) *P. marail*. Gmelin's *P. satyra* is a *Ceriornis*, and his *P. vociferans* is perhaps one of the Mexican *Ortalidæ*. *Phasianus motmot* and *P. parraka* of the same author are both equal to *O. motmot*.

(1790.) Latham, in his 'Index Ornithologicus,' very little advances our knowledge. His *Crax galeata* = *Crax pauxi*, Linnæus; but Linnæus's specific name having been made generic by Temminck, the name *galeata* must be adopted.

(1802.) Azara, in his 'Apuntamientos para la historia natural de los pajaros del Paraguay,' gives recognizable descriptions of four species of this group:—(1) *el Yacúhú*, upon which *P. obscura* of

Temminck is founded; (2) *el Yacu-caraguata* = *Ortalida canicollis* of Wagler; (3) *el Yacu-apati* = *P. jacutinga* of Spix; and (4) *el Mitu*, a good species, united by subsequent authors with *Crax alector*, till Mr. Gray named it *Crax sclateri*.

(1811.) Humboldt, in his 'Recueil d'Observations de Zoologie' (vol. i. p. 4), describes a new *Ortalida* from the River Magdalena, and calls it *Phasianus garrulus* (= *Ortalida garrula*).

(1815.) Temminck, in the second volume of his 'Histoire Naturelle des Pigeons et des Gallinacés,' gives an excellent account of what was then known of the *Cracidæ*, referring them to three genera of his "*Aves gallinæ*," namely *Pauxi*, *Crax*, and *Penelope*. The genus *Pauxi* is here first established for *P. galeata* and *P. mitu*. In *Crax* Temminck places *C. globicera* (= *C. daubentoni*), *C. rubra* (= *C. globicera* ♀), *C. alector*, and *C. carunculata*, the last species being now described for the first time. Of *Penelope* he gives seven species, two of which are now first established, viz. *P. obscura* upon Azara's "*Yacúhú*," and *P. superciliaris*. These both stand good. Temminck unites *Ortalida* with *Penelope*. He also gives good anatomical descriptions and figures of the larynges and tongues of several of the species of *Cracidæ*.

(1823.) In the 'General History of Birds' (vol. viii.), Latham arranges the *Cracidæ* known to him in two genera of his Gallinaceous order, "*Guan*" and "*Curassow*." To the former he assigns eleven species, to the latter eight species. Little original matter is given.

(1823.) In the twenty-sixth livraison of the 'Planches Coloriées' Temminck publishes an article on the genus *Ourax* (= *Pauxi*), and gives a good figure of *Ourax mitu* (= *Mitua tuberosa*).

(1825.) Spix, in the second volume of his 'Aves Brasilienses,' describes and figures seven species of *Crax* and seven of *Penelope*, viz.:—

		Of this Synopsis.
(1)	*Crax fasicolata*	= *C. pinima* (?).
(2)	*C. urumutum*	= *Nothocrax urumutum*.
(3)	*C. tomentosa*	= *Mitua tomentosa*.
(4)	*C. blumenbachii*	= *C. globicera* ♀ (?).
(5)	*C. globulosa*	= *C. globulosa*.
(6)	*C. rubrirostris*	= *C. carunculata*.
(7)	*C. tuberosa*	= *Mitua tuberosa*.
(1)	*Penelope jacuacu*	= *P. boliviana* (?).
(2)	*P. jacucaca*	= *P. jacucaca*.
(3)	*P. jacutinga*	= *P. jacutinga*.
(4)	*P. jacupeba*	= *P. jacupeba*.
(5)	*P. jacupemba*	= *P. superciliaris*.
(6)	*P. guttata*	= *Ortalida guttata*.
(7)	*P. araucuan*	= *O. araucuan*.

As is well known, neither Spix's figures nor his descriptions are very accurate; and until the original type specimens have been examined, some of these determinations must remain doubtful. But Spix has certainly added greatly to our knowledge of the group. Not less than three species of *Cracinæ* (viz. *Nothocrax urumutum*, *Mitua*

tomentosa, and *Crax globulosa*) and five species of *Penelopinæ* (viz. *P. jacucaca*, *P. jacupeba*, *Pipile jacutinga*, *Ortalida guttata* and *O. araucuan*) are due to the researches of his expedition.

(1828.) Lesson, in the second volume of his 'Manuel d'Ornithologie,' describes two new species of Guans discovered by Goudot, one of the travelling naturalists of the Jardin des Plantes, in the interior of New Granada. These are *Penelope aburri* (= *Aburria carunculata*) and *Ortalida goudoti* (= *Chamæpetes goudoti*). Lesson likewise establishes *Crax albini*, which probably = *C. globicera* ♀.

(1830.) Wagler publishes a concise but very important paper in the 'Isis,' his "Revisio generis *Penelope*," and describes eighteen species, dividing them into three sections, A, B, & C, corresponding exactly to the genera *Pipile*, *Penelope*, and *Ortalida*. His excellent diagnoses materially assist us in identifying Spix's species. Wagler describes six species as new from the specimens in the Berlin and Munich museums, upon which he founded his observations. These new species are *P. pileata*, *P. purpurascens*, *P. albiventris*, *P. ruficeps*, *P. vetula*, and *P. poliocephala*. The last four belong to the genus *Ortalida*. He also founds his *P. canicollis* upon the "*Yacu-caraguata*" of Azara, of which, however, he had not seen specimens. The whole of these seven Waglerian species are valid; and this paper may be regarded as the earliest scientific article (in a modern sense) upon this subject.

(1831.) Yarrell, at a meeting of this Society, describes the trachea of *Crax yarrelli* (*i.e. Crax carunculata*).

(1832.) Wagler, in an article on new genera and species of Mammals and Birds, published in the 'Isis,' institutes two new genera of *Cracidæ*, viz. *Salpiza* and *Chamæpetes*. As regards *Salpiza*, it seems that the group thus designated ought to be retained as typical *Penelope*, because Merrem's *Penelope jacupema* certainly belongs to it; so that Wagler's *Penelope* corresponds to what we call (following Reichenbach) *Pipile*, and Wagler's *Salpiza* to our *Penelope*.

(1833.) Prince Max of Neuwied, in his well-known 'Beiträge zur Naturgeschichte von Brasilien,' describes the four species of *Cracidæ* that he met with in the wood-region of South-eastern Brazil, in his usual full and accurate manner. These were (1) *Crax rubrirostris* (= *C. carunculata*), (2) *Penelope superciliaris*, (3) *Penelope leucoptera* (= *Pipile jacutinga*), (4) *Penelope araucuan* (= *Ortalida albiventris*).

(1835.) Bennett, in the second volume of the 'Gardens and Menagerie of the Zoological Society,' gives articles with woodcut illustrations on the following species of this group:—

	Mr. Bennett's names.	(Of this Synopsis.)
Page 9.	Crested Curassow	= *Crax alector*.
65.	Galeated Curassow	= *Pauxi galeata*.
129.	Razor-billed Curassow	= *Mitua tuberosa*.
131.	Guan	= *Penelope cristata*.
325.	Red Curassow	= *Crax globicera* ♀.
227.	Red-knobbed Curassow	= *Crax carunculata* ♂.

The last of these species is here first described as new under the name *Crax yarrelli*; but the name had been previously mentioned, P. Z. S. 1830-31, p. 33.

(1836.) Johann Müller, in his article upon the different forms of the penis in the class of birds (Abh. Ak. Berlin, 1836, p. 137), shows that *Crax* and *Penelope* agree with *Tinamus* in possessing a small rudimentary penis, which is never found in the ordinary *Gallinaceæ*.

(1837.) Swainson, in his 'Classification of Birds,' arranges *Crax* (ranking *Penelope* and the other genera as its subgenera) as a genus of his subfamily *Megapodinæ*, and family *Columbidæ*.

(1844.) Mr. G. R. Gray, in Gray and Mitchell's 'Genera of Birds,' vol. iii., arranges the *Cracidæ* as the first family of his order GALLINÆ, and divides them into two subfamilies, *Penelopinæ* and *Cracinæ*. The *Penelopinæ* contain three genera:—*Ortalida*, with a nominal list of fourteen species; *Penelope*, with ten species; and *Oreophasis*, with one, viz. *O. derbyanus*, which remarkable bird is now introduced into science, and very beautifully figured. Mr. Gray's second subfamily (*Cracinæ*) is divided into two genera, *Crax* and *Pauxi*. An excellent figure is given of the female of *Pauxi galeata*. Six species are referred to *Crax* and three to *Pauxi*. Altogether Mr. Gray enumerates thirty-four species of *Cracidæ* as now known to science; but it must be born in mind that several of the names given are merely synonyms. Three subsequently described species are added to the list in the appendix to this work.

(1844–46.) Tschudi, in his 'Fauna Peruana,' gives four species of *Cracinæ* and six species of *Penelopinæ* as met with in the wood-region of Eastern Peru. His identifications of these birds must be received with caution, being in some cases apparently only founded on recollection. *Crax temminckii*, which he describes as new, is certainly the Central-American *C. globicera*. *Penelope aspersa*, described as new = *Ortalida guttata*; *P. rufiventris* = *Chamæpetes goudoti*. Tschudi, however, gives several interesting anatomical details, in particular concerning the penis of *Penelope*, in confirmation of Johann Müller's discoveries on this subject.

(1846.) The second volume of the 'Knowsley Menagerie' contains four large figures, by Lear, of species of *Penelope*, viz.:—

	Knowsley Menagerie.	(Of this Synopsis.)
Pl. 8.	*P. superciliaris*	= *P. jacucaca*.
9.	*P. pileata*	= *P. pileata*.
10.	*P. pipile*	= *Pipile cumanensis*.
11.	*P. purpurascens*	= *P. marail*.

(1847.) Sir William Jardine, in one of his articles on the birds of Tobago in the 'Annals of Nat. History,' describes *Ortalida ruficauda* as a new species from that island, and the following year ('Contributions to Ornithology, 1848) figures and describes its trachea.

(1848.) Cabanis, in the 'Fauna of British Guiana,' contained in the third volume of 'Schomburgk's Travels,' enumerates five species of *Penelopinæ* and four of *Cracinæ* as obtained by Schomburgk in that country. These are all probably rightly determined, except

perhaps *P. jacucaca*, concerning the identification of which we entertain some doubts.

(1849.) *Penelope pileata* is figured by Des Murs in the 'Iconographie Ornithologique' from a specimen in the Paris Museum.

(1850.) Fraser, in the 'Proceedings' of this Society, describes two new *Cracidæ* from specimens living in the Knowsley collection, viz. *Crax alberti* and *Penelope nigra*, the latter being our *Penelopina nigra*. But note that the bird figured as the female of *C. alberti*, *l. c.* t. xxvii. is the female of *C. globicera*.

(1852.) Reichenbach, in his 'Avium Systema Naturæ,' which forms a kind of preface to his 'Handbuch der speciellen Ornithologie,' gives a list of genera of this family, mainly in explanation of the previously published lithographic plates of structural parts. He establishes two new genera—*Penelopa* for *Penelope albiventris* of Lesson (= *Ortalida leucogastra*), and *Aburria* for *Penelope aburri* of Lesson. The former species is a typical *Ortalida*; the latter genus we adopt.

(1856.) Prince Charles Bonaparte publishes his 'Tableaux Paralléliques de l'Ordre des Gallinacés' in the 'Comptes Rendus' of the Academy of Sciences of Paris. After characterizing two new species of the group, viz. *Pipile argyrotis* (= *Penelope argyrotis*) and *Ortalida montagnii* (= *Stegnolæma montagnii*), but so shortly as to be unrecognizable without reference to the original specimens, in a table of the *Craces*, as he calls them, he divides these birds into two families, *Cracidæ* and *Penelopidæ*; of the former he enumerates ten species, of the latter twenty-nine. The synonymy and arrangement of the species are full of errors, and are barely worth criticism, showing the same marks of haste as most of his later writings. The genus *Pipile*, however, must take date from this paper.

(1856.) Burmeister gives an account of the Brazilian *Cracidæ* in the third volume of his 'Systematische Uebersicht der Thiere Brasiliens.' The general arrangement of the genera and higher groups is very good; but the species are not always correctly identified, and there are some errors in the localities: e.g. *Crax blumenbachii*, Spix, is united with *Crax rubrirostris* (i. e. *C. carunculata*) and *C. fasciolata*! The species met with by Burmeister himself in S.E. Brazil were only three, namely, *Penelope superciliaris*, *P. araucuan* (i. e. *Ortalida albiventris*), and *Crax blumenbachii* (i. e. *C. carunculata*). Burmeister arranges *Opisthocomus* as an intermediate form between *Penelope* and *Crax*; but those who do not go so far as to make this wonderful bird an order of itself (following Huxley) must, we think, at least give it the rank of a separate family.

(1858.) Von Pelzeln, in one of his articles on new birds in the Imperial Cabinet of Vienna, describes *Penelope cujubi* of Natterer's MS. and the two other species of the genus *Pipile*. He gives also Natterer's notes and remarks on these three birds.

(1860.) Baird, in his 'Birds of North America,' includes one member of this group as found on the Rio Grande, within the limits of the United States, and proposes to call it *O. m'calli*, the same bird having been previously referred to *O. vetula* by Lawrence, and

to *O. poliocephala* by Cassin. We have given our reasons below for considering Mr. Lawrence's determination as correct.

(1860.) Mr. G. R. Gray publishes a synopsis of the genus of *Penelope* in this Society's 'Proceedings,' giving short Latin characters of all the species known to him. Four species are described as new, viz.:—

G. R. Gray.	(Of this Synopsis.)
P. nigricapilla	= *P. obscura.*
P. bridgesi	= *P. obscura.*
P. sclateri	= *P. sclateri.*
P. lichtensteini	= *P. argyrotis.*

(1860.) Salvin, in the second volume of 'The Ibis' (p. 248), gives full details of the history of the *Oreophasis derbyanus*, which was previously entirely unknown except from Mr. Gray's figure.

(186-?.) Prof. Reichenbach publishes his "Vollständigste Naturgeschichte der Tauben und Taubenartigen Vögel," forming part of his 'Handbuch der speciellen Ornithologie.' We cannot find any date attached to any part of this work, and therefore cannot give the exact date of issue. Reichenbach divides the natural family *Cracidæ* into two groups—*Cracinæ* and *Penelopinæ*, and, in order to fill up the voids in the number of his ridiculous quaternary system, associates with them the *Didinæ* and *Microdactylinæ* (*i. e.* the Cariamas), and constitutes out of this heterogeneous mass his family "*Alectorinæ*," the fourth division of his "*Columbariæ*." Reichenbach's account of the genera and species of *Cracidæ* is, as regards merit, about on a par with the above-mentioned arrangement of the higher divisions of the group. It is evidently a wretched compilation, written mainly without reference to original specimens. No less than four new species of *Crax* and one of *Penelope* are sought to be established solely upon figures of the older authors; and *Crax* itself is subdivided into four subgenera (*Crax*, *Mituporanga*, *Crossolaryngus*, and *Sphærolaryngus*), the very distinct *Crax urumutum* being left among the typical Craces! *Ortalida leucogastra* and *O. albiventris* are referred to the genus *Chamæpetes*! *Penelopsis* (established in the 'Av. Syst. Nat.' as *Penelops*) is here transferred, to become the type of a genus uniting *P. rufiventris* of Tschudi and *P. adspersa* of the same author!

(1866.) Mr. G. R. Gray describes, in this Society's 'Proceedings,' a new species of *Penelope*, *P. greeyi*, from a specimen living in the Society's gardens.

(1867.) Mr. G. R. Gray publishes his 'List of specimens of Birds of the Order Gallinæ in the British Museum.' In this important work the *Cracidæ* are arranged as the second family of the order, the first being the *Pteroclidæ*, and the third the *Megapodidæ*. This is no doubt very nearly its natural position, as the *Pteroclidæ* are still more nearly allied to the *Columbæ* than the Peristeropodous *Gallinæ*. As in his 'Genera of Birds,' Mr. Gray divides the *Cracidæ* into two subfamilies, *Penelopinæ* and *Cracinæ*. To the former subfamily are referred three genera (*Penelope*, *Ortalida*, and *Oreophasis*), containing altogether thirty-five species represented in the national

collection. The names of ten other species are referred to as perhaps valid. Six species of this subfamily are here described as new, viz.:

G. R. Gray.	(Of this Synopsis.)
Penelope jacquini	= *Pipile cumanensis.*
Ortalida superciliaris	= *O. superciliaris.*
O. bronzina	= *O. ruficauda.*
O. plumbeiceps	= *O. vetula.*
O. wagleri	= *O. wagleri.*
O. cinereiceps	= *O. cinereiceps.*

Mr. Gray's second subfamily, *Cracinæ*, is divided into two genera, *Crax* and *Pauxi*, the former containing seven, the latter three species. Three species of *Crax* are likewise mentioned, of which no specimens are in the national collection. Two species of *Crax* are described as new, viz. *C. sclateri* and *C. daubentoni*. We mainly agree with, and have very nearly followed, Mr. Gray's discrimination of the species of this difficult genus, the principal difference being that we have restored to the species which he calls *C. blumenbachii* what we have endeavoured to show is its older name, *C. globicera*.

(1867.) Salvin, in his article on the birds of Veragua, published in the 'Proceedings' of this Society, describes a second species of the genus *Chamæpetes*, *C. unicolor*.

(1868.) Prof. Huxley, in his article "On the Classification and Distribution of the Alectoromorpha and Heteromorpha," published in this Society's "Proceedings," defines the Alectoromorpha, or typical Gallinaceous birds, and shows that they are divisible into two primary groups—the *Peristeropodes* and *Alectoropodes*, of which the former embraces two families, the *Cracidæ* and *Megapodidæ*. The exact position of the *Cracidæ* in the Systema is thus first accurately determined.

(1869.) Dr. Cabanis, in one of his articles upon the birds of Costa Rica, describes as new *Ortalida frantzii*, which, however, = *O. cinereiceps*, G. R. Gray (1867).

(1870.) The third portion of Von Pelzeln's 'Ornithologie Brasiliens' contains a most important addition to our knowledge of the CRACIDÆ in the account of the species of this group collected by Natterer, altogether 22 in number. Two of these are described as new; and a third (*Crax mikani*) is characterized from specimens in the Imperial Cabinet derived from another source. Descriptions are likewise given of other, imperfectly known species; and many important notes are added, taken either from Natterer's MS. or from v. Pelzeln's own observation. The subjoined list will show the alterations we have ventured to propose in v. Pelzeln's nomenclature:—

Orn. Bras.	v. Pelzeln.	(Of this Synopsis.)
P. 280.	*Penelope cristata*	= *Penelope greeyi*?
281.	*P. nigricapilla*	= *P. jacupeba.*
283.	*P. nattereri*	= *Pipile cumanensis.*
284.	*P. grayi*	= *P. cumanensis.*
285.	*Ortalida superciliaris*	= *Ortalida araucuan.*

Orn. Bras.	V. Pelzeln.	(Of this Synopsis.)
P. 285.	*O. araucuan*	= *O. albiventris.*
286.	*O. albiventris*	= *O. guttata.*
343.	*Crax mikani* ♂	= *Crax daubentoni.*
„	*C. mikani* ♀	= *C. alberti.*

Sect. III. *Synopsis of the Species of* Cracidæ.

The 51 species of Cracidæ known to us seem to be naturally separable into three subfamilies. The external differences between the first two of these groups, although very appreciable to the eye, are not easily expressed in strict definition. There can, however, be no doubt that the Curassows and Guans belong to naturally distinct forms; and Prof. Huxley (P. Z. S. 1868, p. 297) has pointed out a trenchant difference in the proportions of their pelvis, which renders their skeletons easily recognizable. In the *Penelopinæ* the "moiety of the dorsal aspect of the pelvis, which is bounded in front by a line drawn through the acetabula," or "postacetabular area" (as Prof. Huxley proposes to call it), is comparatively broad; in the *Cracinæ* it is narrow. Combining this osteological character with a marked divergence in the form of the rostrum of the two sections, we may divide the subfamilies as follows:—

a. area postacetabulari angusta: rostro superiore altiore quam latum; culmine compresso ..... I. Cracinæ.
b. area postacetabulari lata: rostro superiore latiore quam altum: culmine depresso.
  a'. vertex plumis obtectus: mesorhinium nudum: nares patulæ ..... II. Penelopinæ.
  b'. vertex tuberculo osseo munitus: mesorhinium dense plumosum: nares absconditæ ..... III. Oreophasinæ.

Taking these three subfamilies in order, we propose to arrange them as follows:—

Subfam. I. Cracinæ.

a. rostri cera mollis, plus minusve tumida: nares patulæ in media maxilla positæ ..... 1. *Crax.*
b. rostrum usque ad basin corneum, cera nulla: nares ad basin maxillæ positæ.
  a'. lora nuda, nares patulæ ..... 2. *Nothocrax.*
  b'. lora dense plumosa, nares plumis absconditæ.
    a''. sexus dissimiles: tuberculum frontale maximum, oviforme ..... 3. *Pauxi.*
    b''. sexus similes: culmen valde elevatum sed vix tuberculatum ..... 4. *Mitua.*

Genus 1. Crax.

	Type.
Crax, Linn. S. N. i. p. 269 (1766)	*C. alector.*
Mituporanga, Reichenb. Tauben, p. 136 (186 ?)....	*C. globicera.*
Crossolaryngus, Reichenb. Tauben, p. 136 (186 ?)..	*C. globulosa.*
Sphærolaryngus, Reichenb. Tauben, p. 136 (186 ?)..	*C. alberti.*

Clavis specierum.

a. pectore immaculate nigro.
  a'. mandibularum caruncula nulla.
    a''. loris plumosis ..... 1. *globicera*.
    b''. loris nudis.
      a'''. cauda tota nigra ..... 2. *alector*.
      b'''. cauda albo terminata ..... 3. *sclateri*.
  b'. mandibula carunculata.
    c''. cera flava.
      cauda tota nigra ..... 4. *globulosa*.
      cauda albo terminata ..... 5. *daubentoni*.
    d''. cera rubra ..... 6. *carunculata*.
    e''. cera cærulea ..... 7. *alberti*.
b. pectore nigro albo transfasciolato ..... 8. *pinima*.

1. CRAX GLOBICERA.

Crax globicera, Linn. S. N. i. p. 270 (*partim*); Taylor, Ibis, 1860, p. 311; Salvin, Ibis, 1861, p. 143; Sclater, P. Z. S. 1860, p. 253; Lawr. Ann. Lyc. N. Y. viii. p. 12, ix. p. 139; Frantz. J. f. O. 1869, p. 373.

Crax temminckii, Tsch. F. P. Aves, p. 287.

Crax alberti, ♀, Fraser, P. Z. S. 1850, p. 250, tab. xxviii. (♀.)

Crax blumenbachii, G. R. Gray, List of Gall. p. 15.

Crax alector, Scl. & Salv. Ibis, 1859, p. 223; Moore, P. Z. S. 1859, p. 61.

Crax rubra, Linn. S. N. i. p. 270 (♀); Temm. Pig. et Gall. iii. p. 21 et p. 687 (♀); Lawr. Ann. L.N. Y. vii. p. 301 (♀); Bennett, Gard. & Men. Z. S. ii. p. 225 (♀).

Curasso bird, Edwards's Gleanings, pl. 295; *unde*

Crax edwardsi, Reich. Tauben, p. 134.

Crax albini, Lesson, Trait. d'Orn. p. 484 (♀).

Nitenti-nigra: ventre imo crissoque albis: cristæ elongatæ plumis nigris, apicem versus recurvis: loris plumulosis: cera tuberculata et rostro ad basin luteis, rostri apice cærulescente: pedibus cærulescenti-corneis: long. tota 34 *poll. Angl., alæ* 18·5, *caudæ* 15·5, *tarsi* 4·7.

Fem. *Castanea, ventre imo cinnamomeo: dorso superiore plus minusve nigro induto: capite cristato et cervice undique nigris, albo maculatis: alis extus caudaque nigro et ochraceo plus minusve variegatis et transfasciatis: rostro nigricante, apice pallide cærulescente: pedibus corneis.*

Hab. Western Mexico (*Deppe*); Tehuantepec (*Sumichrast in Mus. Smithson.*); prov. Vera Cruz (*Sallé*); Guatemala, Vera Paz and Pacific coast (*Salvin*); Belize (*Leyland*); Honduras (*Taylor*); Costa Rica (*v. Frantz.*); Panama (*M'Cleannan*).

Mus. Brit., Smithson., S.-G.

Linnæus's *Crax globicera* is founded mainly upon the *Crax curassous* of Brisson (Orn. i. p. 300), which is more likely to be intended for this species than for any other. Brisson mentions the *tubercula ad basin rostri, rotunda, lutea*—which excludes every thing except the present bird and *C. daubentoni*. And as he says nothing whatever of the tail being tipped with white, the balance of evidence is in favour of the former hypothesis. *Crax rubra* of Linnæus, founded

upon *Crax peruvianus* of Brisson (*l. c.* p. 305), is, there can be little doubt, intended for the female of the present bird.

The first author who appears to have correctly identified these birds as male and female is Tschudi, who, in his 'Fauna Peruana,' accurately describes both sexes under the name *Crax temminckii*, from specimens obtained by Deppe in Western Mexico; but he is no doubt in error in supposing that this was the species that he himself saw in the wood-region of Eastern Peru.

In our first paper on the Ornithology of Guatemala we erroneously called this bird *Crax alector*. This mistake was subsequently rectified, and the Central-American bird was referred to *Crax globicera*, which name has generally been adopted by more recent writers for the Central-American bird.

In Mr. G. R. Gray's 'List of Gallinæ' this Curassow is called *Crax blumenbachii*, following Spix's figure (Av. Bras. ii. t. 64). It is possible Mr. Gray may be correct in this reference, as we have seen Central-American specimens nearly as dark as represented in Spix's figure; but if this be so, it can hardly be true, as Spix states, that his specimen was obtained from Rio.

This Curassow is the only species of the genus and subfamily met with in America, north of Panama. We have examined a large number of specimens from different localities between the isthmus and Southern Mexico. The male is quite constant in colour, except that in one Panama specimen the tail shows a very narrow margin of white. The female, on the contrary, is very variable, as we have already pointed out in our diagnosis. In some specimens the wings are wholly red, in others much banded with black and cinnamomeous; in some specimens also the tail-bands are very slight, and almost evanescent; in others they are broad and conspicuous. The upper portion of the back varies from black to chestnut.

2. CRAX ALECTOR.

Crax alector, Linn. S. N. i. p. 269; Temm. Pig. et Gall. iii. p. 27 et p. 689; Vieill. Gall. Ois. ii. p. 6, t. 199; Cab. in. Schomb. Guian. iii. p. 746; Reichenb. Tauben, p. 130; Bennett, Gardens & Men. ii. p. 9; Pelzeln, Orn. Bras. p. 286.

Purpurascenti-nigra: ventre imo crissoque albis: cristæ brevis plumis nigris, versus apicem recurvis: loris nudis: cera et rostro ad basin flavis, hujus apice cærulescente: pedibus corneis: long. tota 35, *alæ* 14·5, *caudæ* 13·5, *tarsi* 4·5.

Fem. *Mari similis, sed crista intus albo parce transfasciata.*

Hab. British Guiana (*Schomb.*); Rio Negro, Rio Vaupé, and Rio Brancho (*Natt.*).

Mus. Brit., Vindob., S.-G.

The species most liable to be confounded with the present Curassow are *Crax globicera* and *Crax sclateri*. From both of these it is distinguishable by the purple tinge of its plumage, which is very noticeable in living specimens, but is also plainly shown in skins. From *C. globicera* it is likewise distinguishable by the naked lores and by the want of the protuberance on the cere; from *C. sclateri* by the absence of the white tips to the tail-feathers and the black

thighs. It differs not only from these, but from almost all other members of the genus in the sexes being nearly alike.

The patria of *C. alector* is Guiana and the adjoining districts of Amazonia up to the Rio Negro. In Upper Amazonia it is replaced by *C. globulosa*.

3. CRAX SCLATERI.

Mitu, Azara, Apunt. iii. p. 83. no. 338.
Crax alector, Hartl. Ind. Az. p. 22.
Crax sclateri, Gray, List of Gall. p. 14; Pelzeln, Orn. Bras. p. 287.
Crax circinatus, Licht. MS. in Mus. Berol. (teste Pelzelno).
Crax discors, Natt. MS. in Mus. Berol. (teste Pelzelno).
Crax azaræ, Natt. MS. in Mus. Vindob. (teste Pelzelno).

Nitenti-nigra: ventre imo, crisso et caudæ apice albis: cristæ mediocris plumis nigris versus apicem recurvis: loris nudis, cera et rostro ad basin flavis: pedibus corneis: long. tota 32, *alæ* 14, *caudæ* 14, *tarsi* 4.

Fem. *Supra nigra, ochracescenti-albo, nisi in cervice, transfasciata: crista alba, basi et apice nigris: subtus gula et cervice nigris: abdomine cinnamomeo, pectore nigro transfasciato: rostri basi obscura, apice cum pedibus flavicantibus.*

Hab. Paraguay (*Azara* et *Page*); Mato Grosso (*Natterer*).

Mus. Brit., Vindob., Smithson., S.-G.

Azara clearly describes both sexes of this Curassow, which appears to be the sole representative of the group in Paraguay and the adjacent portion of the Brazilian province of Matto Grosso.

It was, however, confounded with other species, or provided only with MS. names, till Mr. Gray descibed it in his list of Gallinæ in 1867.

As already remarked, the male of this species closely resembles the corresponding sex of *C. alector*; it is singular, therefore, that the females of the two species should be so very different.

Our description of *Crax sclateri* is taken from Nattererian specimens in the collection of Salvin and Godman; but we have compared them with Smithsonian skins collected by Capt. Page in Paraguay, and find them agree in every respect.

4. CRAX GLOBULOSA.

Crax globulosa, Spix, Av. Bras. ii. p. 50, t. 65 (♂), 66 (♀); Reichenb. Taub. p. 135.
Crax globicera, Bates, Nat. on the Amazon, ii. p. 112.

Nitenti-nigra: ventre imo crissoque albis: crista nigra recurva: loris plumosis: cera tuberculata et mandibula utrinque ad basin carunculata flavis: rostri apice nigra: pedibus rubris: long. tota 36, *alæ* 16, *caudæ* 14·5, *tarsi* 4·4.

Fem. *Mari similis, sed tuberculo et carunculis rostri nullis: ventre fulvo: pedibus rubescentibus.*

Hab. Upper Amazon (*Spix*); Pebas (*Castelnau et Deville*); Rio Napo (*Mus.* G. N. L.)

Mus. Brit., Paris., et G. N. Lawrence.

The well-developed yellow caruncles at the base of the mandible distinguish this species from all its allies except *C. daubentoni*, in which the tail is broadly tipped with white. We have only seen one female of this species—in Mr. Lawrence's collection. It agrees with Spix's figure and description. The variation of the sexes in this bird corresponds to that which obtains in *Crax carunculata*, which has likewise conspicuous caruncles on the base of the bill. It the latter case, however, the caruncles are red instead of yellow.

5. CRAX DAUBENTONI.

Hocco, Faisan de la Guiane, Buff. Pl. Enl. 86.
Crax aldrovandi, Reichenb. Columb. p. 134?
Crax daubentoni, G. R. Gray, List of Gall. p. 15.
Crax globicera, Temm. Nat. Hist. des Gall. iii. p. 12 et p. 686; Reichenb. Taub. p. 133.
Crax mikani ♂, Pelzeln, Orn. Bras. p. 343 (♀)?

Nitenti-nigra: ventre imo et caudæ apice albis: cristæ elongatæ plumis nigris recurvis: loris plumosis: cera tuberculata et mandibula utrinque ad basin carunculata flavis: pedibus nigricantibus: long. tota 32, *alæ* 15·5, *caudæ* 14, *tarsi* 4·5.

Fem. *Mari similis, sed crista ad basin albo obsolete fasciata: ventre et tibiis albo transfasciolatis: cera et rostro nigris.*

Hab. Venezuela, near Caraccas (*Levraud*).
Mus. Brit., Paris.

This Curassow was confounded by the older authors with *C. globicera*; and it must always, perhaps, remain somewhat of an open question to which bird that name is more properly to be applied. Mr. Gray first recognized the existence of the two species, and in his 'List of Gallinæ' gave the name *daubentoni* to the present bird, considering it to be that represented by Buffon and Daubenton as the *Hocco, Faisan de la Guiane* in the 'Planches Enluminées.' The two species are certainly close allies, the differences between them consisting in the present bird having caruncles at the base of the mandible, and white tips to the rectrices. The former character, however, is not very conspicuous, nor are these caruncles represented in the above-mentioned plate.

We were for some time in doubt respecting the correct habitat of this species; but during a recent examination of the examples of this group in the Paris Museum, Sclater found a specimen of it which had been transmitted from the vicinity of Caraccas by M. Levraud. This has indicated, what we before suspected, that the true *patria* of *Crax daubentoni* is the littoral of Venezuela and the northern portions of New Granada, where it takes the place of *C. globicera* on the north and *C. alector* on the south*.

* Since this paper was written, the locality of this species has been further confirmed by the receipt by this Society of a living pair of this *Crax* from Tucacas, in Northern Venezuela (presented by James Wright, Esq., Sept. 29th).
The bird described by Herr v. Pelzeln as the *male* of his *Crax mikani* seems to agree tolerably well with the *female* of this species.

6. CRAX CARUNCULATA.

Crax carunculata, Temm. Pig. et Gall. iii. pp. 44, 690 (1815); Sw. An. in Men. p. 183.

Crax rubrirostris, Spix, Av. Bras. ii. p. 51, t. 67; Max. Beitr. iv. p. 528.

Crax blumenbachii, Burm. Syst. Ueb. iii. p. 345.

Crax yarrellii, Bennett, Gard. and Men. ii. p. 227; Yarrell, P. Z. S. 1830–1, p. 33; Sw. An. in Men. p. 188; Jard. et Selby, Ill. Orn. iv. pl. vi.

Nitenti-nigra: ventre imo crissoque albis: crista nigra, versus apicem recurva: loris nudis: ceræ tuberculo parvo et caruncula utrinque ad basin mandibulæ rubris: pedibus carneis: long. tota 34, *alæ*, 15·5, *caudæ* 13·5, *tarsi* 4.

Fem. *Mari similis, sed crista albo fasciolata et ventre imo crissoque rufis.*

Hab. Wood-region of S.E. Brazil from Rio to Bahia (*Max. et Burm.*).

Mus. Brit.

This Curassow is easily distinguishable by its red bill, and has therefore been less often confounded with other species than most of its congeners. Burmeister, however, has united it to *Crax blumenbachii* of Spix, supposing that Spix's figure (Av. Bras. ii. t. 64) may represent the female of the present bird. This we cannot agree to. Spix's plate obviously represents the female of *C. globicera*, or of some allied species of which we do not yet know the male. If his locality (Rio) be correct, the latter is probably the case.

7. CRAX ALBERTI.

Crax alberti, Fraser, P. Z. S. 1850, p. 246, t. 27; Gray, List of Gallinæ, p. 15; Reichenb. Tauben, p. 136.

Crax mikani ♀, Pelzeln, Orn. Bras. p. 343 (?).

Nitenti-nigra: ventre imo, crisso et caudæ apice albis: crista brevi, recurva, nigra: loris dense plumosis: ceræ tuberculo et mandibulæ carunculis cæruleis: rostri apice corneo: pedibus plumbeis.

Fem. *Nigra: crista albo fasciolata: dorso, alis extus et cauda albo anguste transfasciatis: remigibus externis et abdomine toto castaneis: ventre medio crissoque pallidioribus: pedibus pallide carneis.*

Hab. New Granada.

Mus. Brit., Paris., S.-G.

Mr. Fraser first described this Curassow, which may be readily known by its densely feathered lores and blue wattles, from a specimen living in the aviaries at Knowsley in 1850. It is, however, obvious that the bird described by him as the female of *C. alberti* is not the true female of this species, but that of *Crax globicera*.

Crax alberti is now not unfrequently brought alive to this country. There have been of late years several males in the Society's Gardens; and at the present time there is one female. Its correct habitat has

never yet been given; but we have recently obtained abundant evidence that it inhabits New Granada. A female in the collection of Salvin and Godman was transmitted direct from Bogotá by Mr. G. Crowther. There is a male in the Paris Museum, sent from the same locality by Dr. Lindig, and a female from Sta. Martha by M. Bonnecourt.

The bird described by Herr v. Pelzeln as the female of his *Crax mikani* seems to be the female of this species.

8. CRAX PINIMA.

Crax pinima, Pelzeln, Orn. Bras. p. 287 et p. 341.
Crax fasciolata, Spix, Av. Bras. ii. p. 48, t. 62, *a* (?).

Nigra: cristæ plumis recurvis, albis, ad basin et ad apicem nigris: dorso toto, alis extus et cauda albo transfasciolatis: abdomine cervino, pectore et lateribus nigro transfasciatis: loris nudis, aut plumulis paucis obsitis: rostro nigro, ad basin flavo notato: pedibus rubris: long. tota 29, *alæ* 13·5, *cauda* 11·5, *tarsi* 3·7.
Hab. Vicinity of Pará (*Natt.*).
Mus. Vindob.

Natterer obtained a single specimen of the bird described by Pelzeln as *Crax pinima* in the neighbourhood of Pará, and, as stated by v. Pelzeln, had at first doubts as to its being a valid species. He remarks in his MS. that the *Mutum pinima*, as it is called there, does not differ from the Curassow of Cujabá and Paraguay (*i. e. C. sclateri*). Afterwards he appears to have changed his opinion, and to have designated the present species *C. pinima*. Natterer did not determine the sex of his single specimen; and it is therefore possible that it may have been a female. The specimen we have described is undoubtedly of that sex, as it was formerly living in the Society's collection, and was determined by Mr. Bartlett. Comparing it with two undoubted females of *C. sclateri*, we find it differs principally in the narrowness of the transverse bars above, in the sides of the belly being transversely barred with black, and the broad white tips to the tail-feathers. Pelzeln describes *C. pinima* as smaller than *C. sclateri*; but our specimen is of about the same dimensions. Nor in the bird we describe is it correct to say "*Plumæ cristæ nigræ, fasciis solum duabus albis ornatæ*," as the crest is white, with the bases and tips of the feathers black.

These differences, however, are of no very great importance; and, on the whole, we are of opinion that the *Mutum pinima* of Pará will be found to constitute a different species from *Crax sclateri*. Whether, however, the male will be found to resemble the female, or the corresponding sex of *C. sclateri*, remains to be proved. Von Pelzeln describes what he considers may possibly be the male of this species, from a specimen formerly living in the Imperial Menagerie at Schönbrunn, but does not point out how it is to be distinguished from *C. sclateri*.

There are two birds now living in the Society's Gardens which are probably referable to this species. One of them was acquired, some years ago, along with the bird from which we have taken our

characters, and is identical with it in plumage; the other, which has been recently purchased from the Jardin d'Acclimatation, is apparently darker, and has the white bands on the upper surface extremely narrow.

Genus 2. NOTHOCRAX.

	Type.
Nothocrax, Burm. Syst. Ueb. iii. p. 347	*N. urumutum.*

NOTHOCRAX URUMUTUM.

Crax urumutum, Spix, Av. Bras. ii. p. 49, t. 62; Cab. in Schomb. Guian. iii. p. 746; Reichenb. Tauben, p. 132; Pelzeln, Orn. Bras. p. 288.

Urax urumutum, Burm. Syst. Ueb. iii. p. 347.

Rufescens, nigro vermiculata; pilei cristati plumis elongatis pendentibus nigris: cervice undique et corpore subtus castaneis, ventre imo in cinnamomeum trahente: cauda nigricante, rectricum pogoniis externis rufescentibus nigro vermiculatis: spatio oculari late nudo, in ave viva cærulescenti-flavo: rostro rubro: pedibus corylinis: long. tota 24, *alæ* 12, *caudæ* 10, *tarsi* 2·6.

Hab. British Guiana (*Schomb.*); Rio Negro (*Spix et Natt.*); Rio Pastaza, Upper Amazons (*E. Bartlett*).

Mus. Brit., Vindob., Derb.

Genus 3. PAUXI.

	Type.
Pauxi, Temm. Pig. et Gall. iii. p. 683 (1815).....	*P. galeata.*
Ourax, Cuv. Règn. An. i. p. 440 (1817)	*P. galeata.*
Lophocerus, Swains. Class. of B. ii. p. 353 (1837)....	*P. galeata.*
Urax, Reichenb. Av. Syst. Nat. p. xxvi (1842).....	*P. galeata.*

PAUXI GALEATA.

Crax pauxi, Linn. S. N. i. p. 270.

Pierre de Cayenne, Buff. Pl. Enl. 78.

Crax galeata, Lath. Ind. Orn. ii. p. 624.

Pauxi galeata, Temm. Pig. et Gall. iii. p. 1 et p. 683; Reichenb. Tauben, p. 137.

Ourax pauxi, Cuv. Règn. Anim. 1817, i. p. 441; Bennett, Gard. & Men. ii. p. 65.

Lophocerus galeatus, Swains. Classif. of B. ii. p. 353 et An. in Men. p. 184.

Ourax galeata, Tsch. F. P. p. 289.

Nigra æneo nitens: ventre imo et caudæ apice albis: pilei plumis brevibus, erectis: tuberculo frontali maximo, oviformi, cæruleo: rostro rubro: pedibus carneis: loris dense plumosis: long. tota 34, *alæ* 16, *caudæ*, 13, *tarsi* 4.

Fem. *Rufescens, nigro undulata et vermiculata, capite undique nigro: tectricum alarium et secundariorum marginibus et caudæ apice albicantibus.*

Hab. Cayenne (*Buffon*); Rio Cassiquiari and Orinoco (*Natt.*); Venezuela, near Caraccas (*Levraud* in *Mus. Paris*).

Mus. Brit., Paris.

Buffon assigns Cayenne as the habitat of this Curassow; but Schomburgk does not mention it as found in British Guiana. A more certain locality is the Rio Cassiquiari and Upper Orinoco, where Natterer, although he did not collect specimens, obtained certain evidence of its existence (*Cf.* Von Pelzeln, Orn. Bras. p. 289). Specimens of this bird in the Paris Museum were transmitted from Caraccas by M. Levraud. Tschudi states that it occurs in Eastern Peru. This is possible, but we have never seen it in collections from the Upper Amazon*.

Genus 4. MITUA.

Type.

Mitu, Less. Trait. d'Orn. ii. p. 485 (1831) .... *M. tuberosa*.
Mitua, Strickl. Ann. Nat. Hist. vii. p. 36 (1841) *M. tuberosa*.

Clavis specierum.

a. rostri culmine cultrato: caudæ apice albo..... 1. *M. tuberosa*.
b. rostri culmine rotundato: caudæ apice rufo ..... 2. *M. tomentosa*.

1. MITUA TUBEROSA.

Crax mitu, Linn. S. N. i. p. 270.
Pauxi mitu, Temm. Pig. et Gall. iii. pp. 8, 685.
Mitu brasiliensis, Reichenb. Columb. p. 137.
Ourax mitu, Cuv. Règ. An. 1817, i. p. 441; Temm. Pl. Col. 153; Bennett, Gard. and Men. ii. p. 129.
Urax mitu, Burm. Syst. Ueb. iii. p. 349.
Crax tuberosa, Spix, Av. Bras. ii. p. 51, t. 67 *a*.
Mitua tuberosa, Bates, Nat. on the Amazon, ii. p. 112.
Urax tuberosa, Burm. Syst. Ueb. iii. p. 348.
Ourax erythrorhynchus, Swains. Classif. of B. ii. p. 352, et An. in Men. p. 187.
Urax eythrorhynchus, Cab. in Schomb. Guian. iii. p. 747.

Nigra, purpurascente perfusa: ventre imo castaneo: caudæ apice albo: loris dense plumosis: pilei plumis elongatis, retroductis: culmine valde elevato, antice cultrato, postice et supra nares incrassato, rubro: pedibus rubris: long. tota 33, *alæ* 14, *caudæ* 12, *tarsi* 4.

Fem. *Mari similis*.

Hab. British Guiana (*Schomb.*); Pará, Rio Madeira, Mato Grosso (*Natterer*); Rio Tapajos (*Bates*); Eastern Peru, Chamicurros (*E. Bartlett*).

Mus. Brit., Vindob., S.-G.

2. MITUA TOMENTOSA.

Crax tomentosa, Spix, Av. Bras. ii. p. 49, t. 63.
Pauxi tomentosa, G. R. Gray, Gen. of B. iii. p. 487.

* Since this paper was written, the Society have received two living males of this species direct from Santa Martha along with a female of *Crax alberti*. It is probable, therefore, that *Pauxi galeata* is likewise found in the valley of the Magdalena.

Urax tomentosa, Cab. in Schomb. Guian. iii. p. 746; Burm. Syst. Ueb. iii. p. 349.

Nigra, purpureo nitens: ventre imo castaneo: caudæ apice rufo: pilei plumis subelongatis, paulum extantibus: loris dense plumosis: rostri culmine elevato, subcompresso, rotundato, rubro, apice flavicante: pedibus rubris: long. tota 33, *alæ* 15, *caudæ* 13·5, *tarsi* 4·5.

Fem. *Mari similis.*

Hab. British Guiana (*Schomb.*); Rio Negro (*Spix et Natt.*); Rio Brancho (*Natt.*)

Mus. Brit., Vindob., S.-G.

Subfam. II. PENELOPINÆ.

Conspectus generum Penelopinorum.

a. gulæ palear medium.
- *a'*. remiges externi angustati sed integri.
  - *a''*. gula plumosa ..... 1. *Stegnolæma.*
  - *b''*. gula nuda.
    - *a'''*. sexus similes ..... 2. *Penelope.*
    - *b'''*. sexus dissimiles ..... 3. *Penelopina.*
- *b'*. remiges externi excisi.
  - *a''*. palear breve ..... 4. *Pipile.*
  - *b''*. palear elongatum, lineare ..... 5. *Aburria.*

b. gulæ palear nullum.
- *a'*. gula plumosa: remiges externi excisi ..... 6. *Chamæpetes.*
- *b'*. gula nuda, linea media setosa: remiges externi integri. 7. *Ortalida.*

Genus 1. STEGNOLÆMA*, gen. nov.

Characteres Penelopes, *sed gula summa omnino plumosa, spatio solum in gula inferiore denudato diversa.*

STEGNOLÆMA MONTAGNII.

Ortalida montagnii, Bp. C. R. xlii. p. 875 (1856); Reich. Taub. p. 147; Scl. P. Z. S. 1857, p. 19; 1858, pp. 76, 556; 1860, pp. 63, 72.

Supra olivaceo-brunnea, purpureo subinduta, pileo obscuriore, capitis plumis albo anguste marginatis: dorso inferiore ferrugineo: subtus olivacea, plumis albo marginatis, lateribus et ventre imo ferrugineo perfusis: rostro obscure aurantiaco, pedibus corylinis: long. tota 20, *alæ* 10·2, *caudæ* 9·5, *tarsi* 2·5.

Hab. Int. New Granada; Ecuador, Rio Napo (*Verreaux*); Matos, Chillanes, Nanegal et Puellaro (*Fraser*).

Mus. Brit., S.-G.

Genus 2. PENELOPE.

	Type.
Penelope, Merrem, Av. Ic. et Descr. ii. p. 40 (1786) ..	*P. cristata.*
Salpiza, Wagler, Isis, p. 1226 (1832)	*P. pileata.*

* στεγνὸν, *tegmen*, et λαιμὸς, *gula.*

Clavis specierum.

a. cauda fascia terminali nulla.
  a'. secundariis unicoloribus, immarginatis.
    a''. abdomine æneo-viridi.
      a'''. pileo immaculato, unicolori.
        maxima ..... 1. *purpurascens*.
        media ..... 2. *marail*.
        minor ..... 3. *greeyi*.
      b'''. pileo albo variegato.
        a''''. superciliis albis, infra nigro marginatis ..... 4. *jacucaca*.
        b''''. superciliis distinctis nullis
          major, magis viridescens ..... 5. *jacupeba*.
          minor et obscurior ..... 6. *obscura*.
    b''. abdomine summo æneo, imo rufo.
      a'''. genis unicoloribus immarginatis
        major: uropygio ferrugineo..... 7. *cristata*.
        minor: uropygio fuscescente ..... 8. *boliviana*.
      b'''. genis argenteo marginatis..... 9. *sclateri*.
    c''. abdomine toto castaneo
      pileo albo ..... 10. *pileata*.
      pileo rufescente ..... 11. *ochrogastra*.
  b'. secundariis extus rufo marginatis ..... 12. *superciliaris*.
b. cauda fascia terminali cinnamomea ..... 13. *argyrotis*.

1. PENELOPE PURPURASCENS.

Penelope purpurascens, Wagl. Isis, 1830, p. 1110; Moore, P. Z. S. 1859, p. 61; Sclater, P. Z. S. 1859, pp. 369, 391; Sclat. et Salv. Ibis, 1859, p. 223; G. R. Gray, List of Gallinæ, p. 6.

Salpiza purpurascens, Wagl. Isis, 1832, p. 1226.

Æneo-olivacea: dorsi superioris, alarum tectricum et corporis subtus ad medium ventrem plumis albo marginatis: long. tota 35, *alæ* 15·5, *caudæ* 15·5, *tarsi* 4.

Hab. Mexico, Mazatlan (*Bischoff in Mus. Smiths.*); Tonila (*Xantus*); Oaxaca (*Boucard*); Jalapa (*De Oca*); Guatemala, Vera Paz, and Pacific Slope (*Salvin*); Honduras (*Dyson*).

Mus. Brit., Smithson., S.-G.

This is the only species of *Penelope* we have seen from any part of America north of Nicaragua. In Costa Rica and Panama it is replaced by *P. cristata*, which is easily distinguished by its deep rufous uropygium and lower belly.

2. PENELOPE MARAIL.

Faisan verdâtre de Cayenne, Buff. Pl. Enl. 338.

Penelope jacupema, Merrem, Av. Ic. et Descr. ii. p. 41, tab. xi. (?)

Penelope marail, Gmel. S. N. i. 734; Wagler, Isis, 1830, p. 1110; Temm. Pig. et Gall. iii. p. 56 et p. 692; G. R. Gray, List of Gall. p. 6.

Salpiza marail, Wagl. Isis, 1832, p. 1226; Cab. in Schomb. Guian. iii. p. 745.

Penelope purpurascens, J. E. Gray, Knowsl. Menag. t. 11.

Obscure viridescenti-ænea: cervicis supremæ et corporis subtus

ad medium pectus plumis albo marginatis: ventre imo paulum fuscescentiore: long. tota 30, *alæ* 12·5, *caudæ* 14, *tarsi* 3·2.

Hab. British Guiana.

Mus. Brit.

P. marail, though resembling the previous species, is readily distinguishable by its smaller size and darker colour, and by the absence of white markings on the upper portion of the back. Its range seems strictly confined to the Guianas.

It must always remain doubtful what species Merrem's *Penelope jacupema* was intended for; but his description seems more applicable to the present bird than to *P. cristata*, to which it is sometimes referred.

3. PENELOPE GREEYI.

Penelope greeyi, G. R. Gray, P. Z. S. 1866, p. 266, t. xxii.

Penelope cristata, Pelzeln, Orn. Bras. p. 280 (?).

Similis præcedenti, sed crassitie minore, et colore supra viridi magis purpurascente, forsan diversa: long. tota 24, *alæ* 11, *caudæ* 10·5, *tarsi* 2·4.

Hab. Santa Martha, New Granada.

Mus. Brit.

This seems to be a small form of the preceding species. Besides the type specimen described by Mr. Gray, we have only seen two other examples, which are now living in the Society's Gardens.

If Herr v. Pelzeln's *P. cristata* be not referable to the present species it must belong to one which we have not yet come across.

4. PENELOPE JACUCACA.

Penelope jacucaca, Spix, Av. Bras. ii. t. 69, p. 53; Wagler, Isis, 1830, p. 1110.

Salpiza jacucaca, Wagl. Isis, 1832, p. 1226; Cab. in Schomb. Guian. iii. p. 745.

Penelope superciliaris, J. E. Gray, Knowsl. Menag. ii. pl. 8.

Fuliginoso-nigricans, æneo nitens: tectricibus, plumis sincipitis, juguli, pectoris et epigastrii albo marginatis; vitta superciliari nivea, inferius atro marginata: aurium plumis nigris albo variolosis: long. tota 30, *alæ* 13. (Wagler.)

Hab. Brazil, prov. Bahia (*Spix*); British Guiana (*Schomb.*).

Mus. Derb.

Of this Guan we have only yet met with three specimens, now living in the Society's Gardens. They were purchased of a dealer in Liverpool on the 9th of February last, and were in very bad plumage when received, though now gradually recovering. We have little hesitation in referring them to Spix's species, when explained by Wagler's diagnosis, which we have adopted in the absence of specimens for complete examination.

The "Eyebrowed Guan" of the Knowsley Menagerie is referable to this species, though coloured too rufescent in tint. We have examined the typical specimen now in the Derby Museum at Liverpool.

This species is included by Schomburgk in his 'Fauna of British Guiana;' but it is doubtful whether it really occurs so far north.

5. PENELOPE JACUPEBA.

Penelope jacupeba, Spix, Av. Bras. ii. p. 54, t. 71.

Penelope nigricapilla, Pelzeln, Orn. Bras. pp. 281, 341 (nec G. R. Gray).

Penelope jacucaca, Gray, List of Gall. p. 8 (nec Spix).

Æneo-viridis: dorso inferiore et abdomine toto cupreo perfuso: dorsi superioris, alarum tectricum et corporis subtus ad imum pectus plumis albo utrinque marginatis: frontis et superciliorum plumis argenteo marginatis: long. tota 30, *alæ* 13·5, *caudæ* 12·5, *tarsi* 3·3.

Hab. Brazil, prov. San Paulo (*Natt.*); Rio (*Mus. S.-G.*); Pará (*Spix*).

Mus. Brit., Vindob., S.-G.

Our characters of this species are from one of the specimens obtained by Natterer at Ytararé, and named by Herr v. Pelzeln *P. nigricapilla*. It is not, however, Mr. Gray's *P. nigricapilla*, but agrees perfectly with the specimen in the British Museum referred to *P. jacucaca* of Spix. At first we were inclined to accede to the latter determination, but have recently convinced ourselves that Spix's figure and description of *P. jacucaca* are more satisfactorily applicable to another bird, of which we have given an account above, and which is distinguishable from the present species by its smaller size and by the well-defined white superciliary band, bordered (as Wagler expressly states) by black below. On the other hand, Spix's figure and description of *P. jacupeba* are fairly applicable to the present bird, except as regards its larger size. But a second skin of an immature example in the collection of Salvin and Godman is considerably smaller than the Nattererian specimen above described, and seems to answer to Spix's bird in every respect; so that if we assume that Spix's type was also not adult (which his figure would seem to indicate), we have a name provided for this species.

We may remark that Mr. G. R. Gray agrees with us in referring Spix's *P. jacupeba* to the present species, though in our opinion he has wrongly associated it with *P. jacucaca* of the same author.

Penelope jacupeba, as thus identified, is a fine large species of a general bronzy-green colour, which is somewhat tinged with rufescent on the rump and tail-coverts and still more so on the belly. The feathers of the whole top of the head are more or less edged with silvery grey, particularly on the front and over the eyes, but not so as to constitute a well-defined superciliary stripe; the ear-coverts are black. The characteristic white edgings which are found in all the group are well-defined in this species on the upper back, wing-coverts, neck, and breast. The outer primaries are attenuated as in other species of this genus; the fifth, sixth, and seventh are about equal and longest. The nearest ally of *P. jacupeba* is *P. obscura*,

from which it is mainly distinguishable by its larger size and generally greener and lighter colour.

6. PENELOPE OBSCURA.

El Yacúhú, Azara, Apunt. iii. p. 72. no. 335.

Penelope obscura, Temminck, Pig. et Gall. iii. p. 68, et p. 693; Vieill. Nouv. Dict. xxxvi. p. 343, et Enc. Méth. 361; Wagler, Isis, 1830, p. 1111.

Penelope nigricapilla, G. R. Gray, P. Z. S. 1860, p. 269; List of Gall. p. 7; Reichenb. Tauben, p. 152.

Penelope bridgesi, G. R. Gray, P. Z. S. 1860, p. 270; List of Gall. p. 7; Reichenb. Handb. Tauben, p. 151.

Obscure æneo-viridis: dorso inferiore et abdomine toto chocolatino-brunneis: dorsi superioris, tectricum alarium et corporis subtus ad medium ventrem plumis albo marginatis: pilei antici plumis argenteo anguste marginatis: long. tota 25, *alæ* 11·5, *caudæ* 12, *tarsi* 3.

Hab. Paraguay (*Azara*); Rio Vermejo et Rio Paraguay (*Page*); Bolivia (*Bridges*).

Mus. Brit., Smiths. et S.-G.

The examination of four skins of this Guan obtained by Capt. T. J. Page during his expeditions up the Parana and its confluents in the United-States steamer 'Waterwitch,' and now in the Smithsonian Collection, have enabled us to identify it with Azara's *Yacúhú*, which has hitherto remained unrecognized. Not only does the bird agree sufficiently well with Azara's description, but one of Capt. Page's specimens bears a label with "Pavo del Monte" written on it, the provincial name, according to Azara, of his *Yacúhú*. It follows, therefore, that we must use for this bird the name *obscura*, founded by Temminck upon Azara's description.

Upon comparing the above-mentioned birds with the types of *Penelope bridgesi* and *P. nigricapilla* in the British Museum we have no doubt of their identity. The latter has but faint traces of white markings on the head; but two of Capt. Page's specimens, which we consider not quite mature, have likewise but very slight indications of this feature. Having thus had the advantage of examining six specimens of this Guan at one time, we see that considerable variation is shown in the extent of the white markings on the feathers of the head, a character upon the constancy of which Mr. Gray seems to have depended too much when differentiating his *P. nigricapilla* and *P. bridgesi*.

7. PENELOPE CRISTATA.

Meleagris cristata, Linn. S. N. i. p. 269 (?).

Penelope cristata, Lath. Ind. Orn. ii. p. 619; Temm. Pig. et Gall. iii. p. 46 et p. 691; Wagler, Isis, 1830, p. 1110; Burm. Syst. Ueb. iii. p. 339.

Salpiza cristata, Wagl. Isis, 1832, p. 1226; Cab. in Schomb. Guian. iii. p. 745.

Penelope purpurascens, Lawr. Ann. Lyc. N. Y. viii. p. 12.
Penelope brasiliensis, Bp. C. R. xlii. p. 877.
Penelope jacuaca, Salvin, Ibis, 1869, p. 317.
The Guan, Bennett, Gardens & Men. Z. S. ii. p. 131.

Æneo-viridis, pileo obscuriore : dorso imo et ventre toto cum crisso castaneis : corporis subtus plumis albo marginatis : long. tota 35, *alæ* 14·5, *caudæ* 15, *tarsi* 3·5.

Hab. Costa Rica (*Carmiol*); Panama (*M'Cleannan*); New Granada (*Mus. S.-G.*); British Guiana (*Schomb.*).

Mus. Brit., S.-G.

Whatever the *Meleagris cristata* of Linnæus may have been intended for, there seems to be little donbt that the *Penelope cristata* of Latham, Temminck, and Wagler refers to this species, which is readily known by its large size (almost equal to that of *P. purpurascens*) and the deep chestnut of the lower back and belly.

Mr. Gray considers *P. jacuacu* of Spix referable to the present species; but it seems to us that it is much more reasonable to refer Spix's figure and description to the next, similar but smaller species, which is from the very country where Spix discovered it.

We have examined specimens of this bird from Costa Rica, Panama, and New Granada; we have not yet met with Guianan examples, and it is possible that they may belong to the next species.

8. PENELOPE BOLIVIANA.

Penelope jacuacu, Spix, Av. Bras. ii. p. 52, t. 68 (?).
Penelope boliviana, Reich. Taub. p. 151; Bp. C. R. xlii. p. 877; G. R. Gray, List of Gall. p. 7 (1867); Pelz. Orn. Bras. pp. 282, 339.
Penelope rufescens, Natt. MS.

Supra æneo-viridis : dorsi superioris et tectricum alarum plumis albo marginatis, dorso inferiore fuscescente : subtus, præcipue in ventre, rufescens ; cervicis et pectoris plumis albo marginatis : long. tota 26, *alæ* 12·3, *caudæ* 13, *tarsi* 3·4.

Hab. Solimoens (*Spix*); Rio Madeira et Lake Manaqueri, Upper Amazon (*Natterer*); Yurimaguas (*E. Bartlett*); Rio Huallaga (*Pöppig*).

Mus. Brit., Vindob., S. & G.

This Guan most nearly resembles the large species we have called *P. cristata*, but is distinguishable by its smaller size, by the lower back being only slightly rufescent instead of deep chestnut, by the well-defined white edgings of the feathers of the upper back (which are almost, if not quite, absent in *P. cristata*), and by the rufescent colour below extending over the lower surface of the breast, though with a more subdued tint.

Our description is taken from one of Natterer's Amazonian specimens, which agrees with the bird called *P. boliviana* in the British Museum, and with Mr. Bartlett's skin from Yurimaguas.

There is a living example of this bird now in the Society's Gardens.

9. PENELOPE SCLATERI.

Penelope sclateri, G. R. Gray, P. Z. S. 1860, p. 270; List of Gall. p. 7; Reichenb. Columb. p. 181.

Supra fuscescenti-ænea, dorso postico sordide rufescente: pileo antici, superciliorum et genarum plumis argenteo limbatis: dorso superiore et alis extus albo parce flammulatis: subtus magis brunnescens, pectore albo flammulato: ventre toto crissoque saturate rufis: long. tota 22, *alæ* 10·2, *caudæ* 9·8, *tarsi* 2·35.

Hab. Bolivia (*Bridges*).

Mus. Brit., Derb.

With this Guan we are only acquainted from inspection of the typical specimens in the National Collection. It seems to be a well-marked species, easily recognizable by the silvery white edgings of its superciliaries and cheeks. In other respects it is somewhat like *Stegnolæma montagnii*, but has the whole throat nude.

10. PENELOPE PILEATA.

Penelope pileata, Wagl. Isis, 1830, p. 1110; G. R. Gray, List of Gall. p. 7; Pelz. Orn. Bras. pp. 282, 340; Des Murs, Icon. Orn. t. 23.

Pipile pileata, Reichenb. Columb. p. 153.

Salpiza pileata, Wagl. Isis, 1832, p. 1226; J. E. Gray, Knowsl. Menag. t. 9.

Obscure æneo-viridis; pileo albo, postice rufescente; genis et linea superciliari nigris: interscapulii et tectricum alarium plumis albo marginatis: collo undique et corpore subtus castaneis: ventre albo flammulato: long. tota 29, *alæ* 12, *caudæ* 13, *tarsi* 3·2.

Hab. Amazonia: vic. of Pará (*Wagler*); Rio Madeira and Rio Vautá (*Natterer*).

Mus. Brit., Vindob., S. & G.

11. PENELOPE OCHROGASTER.

Penelope ochrogaster, Pelz. Orn. Bras. pp. 282, 337.

Supra obscure fusca, uropygium versus rufescens; dorsi superioris et tectricum alarum plumis albo marginatis: pileo rufescente, frontis et superciliorum plumis albo marginatis: linea superciliari et genis nigris: subtus castanea, usque ad medium ventrem albo flammulata: long. tota 29, *alæ* 13·5, *caudæ* 14·5, *tarsi* 3·5.

Hab. Brasil. int. near Cuyaba (*Natt.*).

Mus. Vindob., S. & G.

Obs. Species a præcedente simili pileo rufescente et cervice postice minime castanea distinguenda.

12. PENELOPE SUPERCILIARIS.

Penelope superciliaris, Temm. Pig. et Gall. iii. p. 72 et p. 693 (1815); Wagl. Isis, 1830, p. 1110; Max. Beitr. iv. p. 539; Burm. Syst. Ueb. iii. p. 337; Gray, List of Gall. p. 7; Pelz. Orn. Bras. p. 282.

Salpiza superciliaris, Wagl. Isis, 1832, p. 1226.
Penelope jacupemba, Spix, Av. Bras. ii. p. 55, t. 72.

Supra æneo-viridis, superciliis angustis albis: secundariorum uropygii et caudæ tectricum plumis rufo marginatis: subtus magis cinerea, plumis usque ad medium ventrem albo marginatis: ventre imo et crisso rufescentibus: long. tota 26, *alæ* 9·8, *caudæ* 10·8, *tarsi* 2·7.

Hab. Wood-region of S.E. Brazil (*Max. et Burm.*); vic. of Bahia (*Wucherer*); provinces of Rio and San Paulo (*Natt.*).

Mus. Brit., Vindob., Smithson., S. & G.

The rufous edgings to the secondary wing-feathers render this Guan readily recognizable. The superciliary stripe, although distinct, is not so broad as in *P. jacucaca*, nor does it extend across the forehead as in the latter species.

There are several examples of this bird now living in the Society's Gardens.

13. PENELOPE ARGYROTIS.

Pipile argyrotis, Bp. C. R. xlii. p. 875 (1856).
Penelope montana, Licht. in Mus. Berol. (Nomencl. p. 86); Bp. C. R. xlii. p. 877 (descr. nulla); Reichenb. Tauben, p. 151.
Penelope lichtensteinii, G. R. Gray, P. Z. S. 1860, p. 269; et List Gall. p. 7 (1867).

Fuscescenti-æneo-viridis: dorsi superioris, alarum tectricum et corporis subtus plumis albo marginatis: uropygio et ventre imo cum lateribus rufescentibus: pileo cuprescenti-æneo, frontis, superciliarum et genarum plumis albo marginatis: caudæ rectricibus lateralibus æneo-nigris, fascia apicali pollicari cinnamomea terminatis, mediis rufescentibus apicem versus cinnamomeis: long. tota 25, *alæ* 11, *caudæ* 11, *tarsi* 2·3.

Hab. Venezuela, S. Martha (*Verreaux*); Caraccas (*Mus. Paris.*); Int. of New Granada, Bogotá (*Mus. S.-G.*).

Mus. Brit., Paris., S. & G.

Sclater has examined two skins of this Guan in the Paris Museum, which are marked *Pipile argyrotis* in Bonaparte's own handwriting, and has thus determined the species to which the term is referable. This could hardly have been even guessed at from the fragment of description attached to the name in the 'Comptes Rendus.'

The distinct and peculiar terminal tail-band at once distinguishes this *Penelope* from all its congeners.

Genus 3. PENELOPINA.

	Type.
Penelopina, Reichenb. Columb. p. 152	*P. nigra.*

PENELOPINA NIGRA.

Penelope nigra, Fraser, P. Z. S. 1850, p. 246, pl. 29; Sclat. et Salv. Ibis, 1859, p. 224; Salv. P. Z. S. 1867, p. 160.
Penelopina nigra, Reichenb. Tauben, p. 152.

Purpurascenti-nigra unicolor, subtus in ventre magis obscura: rostro et cum pedibus gula nuda rubris: long. tota 24, *alæ* 9·5, *caudæ* 10·5, *tarsi* 2·8.

Fem. *nigra, rufo frequentissime vermiculata: pectore fere immaculato.*

Hab. Guatemala, Vera Paz, and Volcanoes of Agua and Fuego (*Salvin*).

Mus. Brit., S.-G.

Genus 4. PIPILE.

	Type.
Penelope, Wagler, Isis, p. 1226 (1832)	*P. cumanensis.*
Pipile, Bp. C. R. xlii. p. 877 (1856).....	*P. cumanensis.*

Clavis specierum.

a. Caruncula gulari cærulea	1. *P. cumanensis.*
b. Caruncula gulari rubra	
plaga alari alba.....	2. *P. jacutinga.*
alis nigris, albo striatis	3. *P. cujubi.*

1. PIPILE CUMANENSIS.

Crax cumanensis, Jacquin, Beytr. t. 10, p. 25 (1784).

Crax pipile, Jacquin, ibid. t. 11, p. 26.

Penelope cumanensis, Gm. S. N. i. p. 734; Wagl. Isis, 1830, p. 1109; Léotaud, Ois. de Trin. p. 383; Pelzeln, Sitz. Ak. Wien, xxxi. p. 330.

Penelope pipile, Temm. Pig. et Gall. iii. p. 76 et p. 694; Cab. in Schomb. Guian. iii. p. 745; Gray, Knowsley Menag. ii. t. 10; Sclater, P. Z. S. 1855, p. 163, 1858, p. 76.

Pipile cumanensis, Bp. C. R. xlii. p. 877; Reichenb. Tauben, p. 154; Sclat. et Salv. P. Z. S. 1859, p. 598.

Pipile nattereri, Reichenb. Tauben, p. 154.

Penelope nattereri, Pelzeln, Orn. Bras. p. 283.

Penelope jacquinii, G. R. Gray, List of Gallinæ, p. 8.

Penelope grayi, Pelzeln, Orn. Bras. p. 284.

Nigra, æneo-nitens: pileo toto cum fronte albis, scapis plumarum angustissime nigris: tectricum alarium et pectoris plumarum marginibus cum plaga magna alari albis: genis omnino nudis et cum caruncula gulari cæruleis: long. tota 27, *alæ* 13, *caudæ* 11, *tarsi* 2·5.

Hab. British Guiana (*Schomb.*); Venezuela (*Beauperthuy in Mus. Par.*); Trinidad (*Léotaud*); Bogotá (*Mus. S.-G.*); Mato-Grosso, Upper Amazon, and Rio Negro (*Natt.*); Eastern Peru, Cosnipata valley (*Whitely*); Bolivia (*D'Orb. in Mus. Par.*); Rio Napo (*Verreaux*).

Mus. Brit., Paris., Vindob., S.-G.

The specimen in the British Museum distinguished by Mr. Gray as *P. jacquinii* (said to be from Peru) seems to us to be hardly separable from the present species. The shafts of the head-feathers are dark, and more distinctly marked; the white of the head extends rather further down the neck, and there is rather more white on the larger wing-coverts, than in the specimens assigned in the British

Museum to *P. cumanensis*; but in other respects the examples of the two supposed species agree.

Von Pelzeln has named two Nattererian specimens of *Pipile* from Mato Grosso (Orn. Bras. p. 284) *Penelope grayi*, supposing them to be the *P. jacquinii* of Gray (nec Reichenbach), but does not explain how they differ from his *P. nattereri*, i. e. *P. cumanensis*.

2. PIPILE JACUTINGA.

Penelope pipile, var. *a*, Temm. Pig. et Gall. iii. p. 76, et p. 69.
Penelope jacutinga, Spix, Av. Bras. ii. p. 53, t. 70 (1825); Gray, List of Gallinæ, p. 8; Pelzeln, Orn. Bras. p. 283.
Penelope leucoptera, Max. Reise, i. p. 139, ii. p. 110; Beitr. iv. p. 544.
Penelope pipile, Wagl. Isis, 1830, p. 1109; Burm. Syst. Ueb. iii. p. 336; Pelzeln, Sitzungsb. Ak. Wien, xxxi. p. 329.
Penelope nigrifrons, Less. Tr. d'Orn. p. 482.
Pipile leucolophos, Bp. Compt. Rend. xlii. p. 877; Reichenb. Tauben, p. 152.
Pipile nigrifrons, Bp. C. R. xlii. p. 877.
Yacu-apeti, Azara, Apunt. iii. p. 80.

Nigra purpureo-nitens: fronte nigra: pileo cum nucha albo, scapis plumarum anguste nigris: plaga alari maxima et cervicis subtus pectorisque plumarum marginibus albis: genis partim plumosis cæruleis: caruncula gulari rubra: long. tota 28, *alæ* 14, *caudæ* 12, *tarsi* 2·6.

Hab. Wood-region of S.E. Brazil (*Max. et Burm.*); San Paulo (*Natt.*); Paraguay (*Azara*).
Mus. Brit., Vindob., S.-G.

3. PIPILE CUJUBI.

Penelope cujubi, Pelzeln, Sitzungsb. Ak. Wien, xxxi. p. 329 (1858); Orn. Bras. p. 284.
Pipile cujubi, Reichenb. Tauben, p. 153.

Brunneo-nigra, nitore violaceo: pileo nigro, plumis albo marginatis; fronte alba, scapis plumarum nigris: tectricibus alarum albo striatis: caruncula gulari rubra: long. tota 26, *alæ* 12·5, *caudæ* 11, *tarsi* 2·3.

Hab. Pará (*Natt.*).
Mus. Brit., Vindob., Paris.

There is one specimen of this rare Guan in the British Museum and one in the Paris collection, both originally from birds living in captivity. The species may be immediately distinguished by the want of the conspicuous white wing-patch, which is replaced by narrow edgings to some of the wing-coverts.

Genus 5. ABURRIA.

Type.

Aburria, Reichenb. Av. S. N. p. xxvi (1859) .. *A. carunculata*.

ABURRIA CARUNCULATA.

Penelope aburri, Lesson, Dict. des Sci. Nat. lix. p. 191; Man. d'Orn. p. 482; ej. Compl. p. 426; Gray, List of Gall. p. 9.

Penelope carunculata, Temm. MS.

Aburria carunculata, Reichenb. Syst. Av. p. xxvi; Tauben, p. 141; Bp. C. R. xlii. p. 877; Sclater, P. Z. S. 1857, p. 19, et 1858, p. 76.

Nigra unicolor, æneo-viridescente induta: gula parce plumosa, caruncula longa vermiformi ornata: long. tota 29, *alæ* 13·5, *caudæ* 11·5, *tarsi* 2·8.

Fem. *Mari similis.*

Hab. Interior of New Granada; Valley of Cauca, and Mountains of Quindiu (*Goudot*); Rio Napo (*Verr.*).

Mus. Brit., S.-G.

Genus 6. CHAMÆPETES.

	Type.
Chamæpetes, Wagler, Isis, 1832, p. 1227	*C. goudoti.*

Clavis specierum.

a. Fuscescenti-olivacea, abdomine castaneo ..... 1. *C. goudoti.*
b. Viridescenti-nigra, unicolor..... 2. *C. unicolor.*

1. CHAMÆPETES GOUDOTI.

Ortalida goudotii, Lesson, Man. d'Orn. ii. p. 217; Dict. d. Sc. Nat. lix. p. 195; Trait. d'Orn. p. 481; Compl. p. 442; Gray, List of Gall. p. 13.

Chamæpetes goudoti, Wagl. Isis, 1832, p. 1227; Reichenb. Tauben, p. 142.

Penelope rufiventris, Tsch. F. P. Aves, p. 291, t. xxxi.

Ortalida rufiventris, Sclater, P. Z. S. 1859, p. 147.

Fuscescenti-olivacea, æneo induta: subtus magis grisescens, abdomine toto castaneo: facie tota nuda, in ave viva cærulea: pedibus rubris: long. tota 19, *alæ* 9·5, *caudæ* 10, *tarsi* 2·5.

Hab. New Granada; Mountains of Quindiu (*Goudot*); Ecuador, Pallatangá (*Fraser*); Andes of Peru, alt. 7200 ped. (*Tschudi*).

Mus. Brit., S.-G.

Sclater has examined the types of Tschudi's *Penelope rufiventris* in the Neuchatel collection, and is of opinion that, in spite of what Tschudi affirms, they are the same as *Ortalida goudoti.*

2. CHAMÆPETES UNICOLOR.

Chamæpetes unicolor, Salv. P. Z. S. 1867, p. 159; Lawr. Ann. N. Y. Lyc. ix. p. 139.

Nigra, viridescenti-nitens: abdomine paulo obscuriore: rostro nigro: pedibus rubris: long. tota 24, *alæ* 11, *caudæ* 11, *tarsi* 2·8.

Fem. *Mari similis.*

Hab. Veragua (*Arcé*); Costa Rica (*Carmiol*).

Mus. Brit., Smithson., S.-G.

Genus 7. ORTALIDA.

	Type.
Ortalida, Merrem, Av. Ic. et Descr. ii. p. 40 (1786).	*O. motmot.*
Penelops, Reichenb. Syst. Av. p. xxvi (1853)	*O. albiventris.*

Clavis specierum.

a. remigibus externis fuscis aut æneo-fuscis.
  a'. rectricum externarum apicibus castaneis.
    a''. pectore fere immaculato unicolori.
      a'''. rectr. ext. omnino castaneis
        major, capite rufo ..... 1. *motmot.*
        minor, capite fuscescente ..... 2. *araucuan.*
      b'''. rectr. ext. castaneo terminatis.
        a''''. capite rufo ..... 3. *ruficeps.*
        b''''. capite fusco.
          a'''''. abdomine læte castaneo. 4. *wagleri.*
          b'''''. abd. dilute rufescente
            pectore cervino ..... 5. *ruficauda.*
            pectore cinereo ..... 6. *canicollis.*
    b''. pectore albo variegato.
      c'''. pileo rufescente
        ventre albo ..... 7. *albiventris.*
        ventre cinereo ..... 8. *squamata.*
      d'''. pileo obscure cinereo.
        c''''. superciliis nullis
          major, pectoris plumis angust. marg. ..... 9. *caracco.*
          minor, pectoris plumis latius marg. ..... 10. *guttata.*
        d''''. superciliis albis..... 11. *superciliaris.*
  b'. rectricum externarum apicibus albis aut cervinis.
    c''. ventre cervino
      major; cauda valde elongata ..... 12. *poliocephala.*
      minor; cauda mediocri ..... 13. *vetula.*
    d''. ventre albo..... 14. *leucogastra.*
b. remigibus externis castaneis.
  c'. rectricum externarum apicibus albidis
    capite rufescente..... 15. *garrula.*
    capite fuscescente ..... 16. *cinereiceps.*
  d'. rectricum externarum apicibus castaneis ..... 17. *erythroptera.*

1. ORTALIDA MOTMOT.

Phasianus motmot, Linn. S. N. i. p. 271; Gm. S. N. i. p. 740.
Faisan de la Guiane, Buff. Pl. Enl. 146.
Phasianus katraca, Bodd.
Phasianus parraka, Gm. S. N. i. p. 740.
Penelope parrakoua, Temm. Pig. et Gall. iii. p. 695; Burm. Syst. Ueb. iii. p. 341.
Phasianus parraqua, Lath. Ind. Orn. ii. p. 632.
Penelope motmot, Wagl. Isis, 1830, p. 1111.
Ortalida motmot, Wagl. Isis, 1832, p. 1227; Cab. in Schomb. Guian. iii. p. 744; Gray, List of Gallinæ, p. 10; Pelzeln, Orn. Bras. p. 285.

Supra æneo-fusca: alis extus caudæque rectricibus quatuor mediis magis æneis: capite toto rufo: subtus saturate grisea, ventre dilutiore: caudæ rectricibus externis castaneis: rostro plumbeo, apice flavicante: pedibus carneis: long. tota 23, *alæ* 8, *caudæ* 11, *tarsi* 2·8.

Hab. Cayenne (*Buffon*); Brit. Guiana (*Schomb.*); Rio Negro et Rio Brancho (*Natt.*).
Mus. Brit., Berol., Vindob., et S.-G.

In one of our skins of this species from the Rio Negro (*Natt.*), the three outer pairs of rectrices are wholly chestnut down to the base; in a second (from Demerara) there are traces of bronzy green at the base.

2. ORTALIDA ARAUCUAN.

Penelope aracuan, Spix, Av. Bras. ii. t. 74.

Penelope araucuan, Spix, Av. Bras. ii. p. 56; Wagl. Isis, 1830, p. 1112.

Ortalida araucuan, Wagl. Isis, 1832, p. 1227; G. R. Gray, List of Gall. p. 11.

Ortalida superciliaris, Pelzeln, Orn. Bras. p. 285.

Supra æneo-fusca unicolor, pileo parum obscuriore: subtus saturate grisea, ventro medio dilutiore: rectricibus quatuor mediis æneis, ceteris castaneis, ad basin æneis: rostro plumbeo, apice flavicante, pedibus plumbeis: long. tota 16·5, *alæ* 7, *caudæ* 8, *tarsi* 1·9.

Hab. Lower Amazonia, prov. Maranham (*Spix*); vicinity of Pará (*Natterer*).

Mus. Brit., Vindob., S.-G.

Obs. Similis præcedenti, sed crassitie minore et pileo obscuro nec rufo facile distinguenda.

This *Ortalida* must be carefully distinguished from *O. albiventris* of S.E. Brazil—a very different species, which has been called *O. araucuan* by Max. and Burmeister. *O. albiventris* is a larger bird, and has the head and uropygium bright rufous, and the belly white.

Natterer obtained examples of this bird at Pará, the Rio Muria, and Praia de Cajutaba. One of these is now in Salvin and Godman's collection. This species is probably the representative of *O. motmot* on the south bank of the Amazons.

3. ORTALIDA RUFICEPS.

Penelope ruficeps, Wagl. Isis, 1830, p. 1113.

Ortalida ruficeps, Wagl. Isis, 1832, p. 1227.

Pileo ac nucha rufis: notæo toto olivaceo-fusco: pectore griseo-olivaceo: gastræo griseo: cristo fuscescente: rectricibus duabus mediis æneo-fuscis, sequente concolori, apice rufescente: reliquis prima medietate et ultra æneo-fuscis: dein cinnamomeo-rufis.

Adult. *long. tota* 16·25, *caudæ* 7·8.

Hab. Brazil.

Mus. Berol.

Obs. Similis *P. motmot* et *P. albiventris*: a prima statura minore, caudæ pictura &c., ab altera uropygii, pectoris, caudæ colore, statura minore &c., satis distincta. (*Wagler.*)

We have no examples of this *Ortalida*; but Sclater has examined the type in the Berlin Museum, and believes it to be a good species. We have copied Wagler's description of it. It appears to be most like *O. motmot*, but is much smaller, and has the basal portion of the outer tail-feathers æneous.

viridi, rectricibus tribus externis castaneo late terminatis: rostro plumbeo flavicante terminato, pedibus pallide corylinis: long. tota 20, *alæ* 8·1, *caudæ* 10, *tarsi* 2·5.

Hab. Brazil, prov. Sta Catherina (?) (*Wells in Mus. Smiths.*).

Mus. Brit., Smithson.

The bird we have described above appears to be very closely allied to *O. albiventris*, which it probably represents in the more southern portion of Brazil. Mr. G. R. Gray having named the single specimen in the British Museum "*O. squamata*, Lesson," we have followed his determination, although Lesson's description is, as usual, short and vague, and would be equally applicable to more than one other member of the genus. Our characters of this species are taken from a skin belonging to the Smithsonian Institution, which was collected in Brazil by Mr. Lemuel Wells, probably in the province of Santa Catarina.

9. ORTALIDA CARACCO.

Penelope, sp., Poeppig, Froriep's Notiz. 1831, no. 681, Beil, p. 8.
Ortalida caracco, Wagl. Isis, 1832, p. 1111.
Ortalida adspersa, G. R. Gray, List of Gall. p. 13.

Suturate æneo-viridis, fronte albescente: uropygio paulum rufescente tincto: subtus dilutior, gutturis et pectoris plumis stricte albo marginatis, abdomine grisescenti-æneo, hypochondriis et crisso rufescentibus: rectricibus externis castaneis: cæteris æneo-viridibus: rostro plumbeo, apice albicante; pedibus fuscis: long. tota 22, *alæ* 9, *caudæ* 10, *tarsi* 2·5.

Hab. New Granada (*Mus. Vindob.*), Upper Amazonia (*Poeppig*).

Mus. Brit., Vindob., S.-G.

Similis *O. guttatæ*, sed crassitie majore, fronte albicante, et cervicis plumarum marginibus angustius albis distinguenda.

We have a single specimen of this bird, received in exchange from the Vienna Museum, under the name we have adopted for it. It is labelled "Bogotá, *Boissoneau*." There is a single skin in the British Museum well agreeing with it, which Mr. Gray has called *Ortalida adspersa*; but having one of Tschudi's type specimens of *O. adspersa*, we have been enabled to decide that this name is merely a synonym of *O. guttata*.

10. ORTALIDA GUTTATA.

Penelope guttata, Spix, Av. Bras. ii. p. 55, t. 73; Wagl. Isis, 1830, p. 1112; Burm. Syst. Ueb. iii. p. 341.
Ortalida guttata, Wagl. Isis, 1832, p. 1227; Sclater, P. Z. S. 1858, p. 76; Scl. et Salv. P. Z. S. 1869, p. 598.
Ortalida adspersa, Tsch. Wiegm. Arch. 1843, p. 363; Faun. Per. *Aves*, p. 290.
Ortalida albiventris, Pelz. Orn. Bras. p. 286.
Penelope maculata, Natt. MS.

Supra æneo-viridis, pileo nigricantiore: uropygio toto rufescente: subtus gutturis et cervicis plumis grisescenti-albido guttatis: ventre

Hab. Paraguay (*Azara*); Rio Parana et R. Vermejo (*Page*); Villa Maria, Upper Paraguay (*Natterer*).

Mus. Vindob., Paris., et Smithsoniano.

Obs. Similis *O. ruficaudæ*, sed pileo pallidiore cinereo, gutture variegato, et caudæ apicibus latius castaneis distinguenda.

We have had some difficulty in finding trustworthy characters whereby to distinguish this species, of which Herr von Pelzeln has lent us a specimen from the Imperial Cabinet of Vienna, from *O. ruficauda* of Venezuela. The two birds are very nearly related; but so far as we can see the points of distinction pointed out above can be relied on. The specimens belonging to the Smithsonian Institution, which have also been forwarded to us for comparison, and which were collected on the banks of the rivers Parana and Vermejo by Capt. Page, are decidedly smaller in all their dimensions than the Nattererian example, but do not otherwise differ.

Sclater has examined two skins in the Paris Museum apparently of this species. One of these, collected by D'Orbigny, has no locality attached to it; the other was obtained by MM. Castelnau and Deville on the Rio Paraguay.

7. ORTALIDA ALBIVENTRIS.

Penelope albiventris, Wagl. Isis, 1830, p. 1111.

Ortalida albiventris, Wagl. Isis, 1832, p. 1227; G. R. Gray, List of Gall. p. 12.

Ortalida araucuan, Pelzeln, Orn. Bras. p. 285.

Penelope araucuan, Max. Beitr. iv. p. 549; Burm. Syst. Ueb. iii. p. 340.

Supra æneo-viridis: pileo et uropygio rufis: subtus dilutior, gutturis et pectoris plumis albo guttatis: ventre toto pure albo: crisso fulvescente: subalaribus rufis: cauda æneo-viridi, rectricibus tribus externis castaneo late terminatis: rostro nigricanti-plumbeo, apice albo, pedibus plumbeis: long. tota 19, *alæ* 7, *caudæ* 8·5, *tarsi* 2·3.

Hab. S.E. Brazil; Bahia (*Wucherer*); Minas Geraës (*Burm.*).

Mus. Brit., Vindob., S.-G.

This species seems to be confined to the vicinity of Bahia and the adjoining parts of Minas. Pr. Max. tells us it is not found south of the Rio Doce. It is easily distinguished by its pure white belly, and red head and lower back. Pr. Max. and Burmeister have called it *O. araucuan*; and Spix perhaps united the two species in his description, though his figure clearly refers to the bird to which we have retained his name.

8. ORTALIDA SQUAMATA.

Ortalida squamata, Less. Dict. des Sc. Nat. lix. p. 195; Trait. d'Orn. p. 481; Compl. de Buff. p. 443; G. R. Gray, List of Gall. p. 10.

Supra brunnescenti-æneo-viridis: pileo et uropygio rufis: subtus dilutior, ventre griseo, gutturis et pectoris plumis albescente stricte marginatis; hypochondriis et crisso rufescentibus; cauda æneo-

We were much puzzled as to the difference between this species and *O. vetula* until we had examined the specimens already recorded as having been obtained by Mr. le Strange in the vicinity of Mexico; and our American friends appear to have been in equal perplexity upon the subject. But upon comparison of examples of the two species all doubt vanishes, and the accuracy of Wagler's views becomes at once apparent. The present bird is at once distinguishable from *O. vetula* by its larger size, its white belly, and especially by its very long tail.

The Smithsonian collection contains two examples of this species, obtained by Xantus on the Rio de la Armeria and Tupila River in 1863.

13. ORTALIDA VETULA*.

Penelope vetula, Wagl. Isis, 1830, p. 1112.

Ortalida vetula, Wagl. Isis, 1832, p. 1227; Lawr. Ann. Lyc. N.Y. v. p. 116; Sclater, P. Z. S. 1859, p. 391; Moore, P. Z. S. 1859, p. 62; Scl. et Salv. Ibis, 1859, p. 224; Taylor, Ibis, 1860, p. 311.

Ortalida poliocephala, Cassin, Illustr. p. 267, t. 44; Sclater, P. Z. S. 1856, p. 310.

Ortalida maccalli, Baird, B. N. A. p. 611; Lawr. Ann. Lyc. N. Y. ix. p. 209; Dresser, Ibis, 1866, p. 24.

Ortalida plumbeiceps, Gray, List of Gallinæ, p. 11.

Fuscescenti-olivacea: capite plumbeo: subtus dilutior, ventre medio ochraceo aut rufescente tincto: cauda æneo-viridi, rectricibus quinque lateralibus albo aut cervino terminatis: long. tota 21, *alæ* 7·7, *caudæ* 9·0, *tarsi* 2·5.

Hab. Texas, on the Rio Grande (*M'Call & Dresser*); State of Vera Cruz (*Sallé, Boucard*); Yucatan, near Merida (*Schott*); Guatemala, Vera Paz (*Salvin*); Honduras (*Leyland*).

Mus. Brit., Paris., Berol., Smiths., S.-G.

We have examined a large series of specimens of this Guan, including the types of *O. maccalli* and *O. plumbeiceps*. We were at first inclined to allow the latter (established by Mr. Gray upon Guatemalan specimens)to be distinct, from its smaller size and from the fulvous colouring of the terminations of the rectrices. In northern and central Mexican specimens, including the type of *O.*

* Next to this species must be inserted a new one, of which a single skin has lately come into our possession:—

ORTALIDA RUFICRISSA, sp. nov.

Fuscescenti-olivacea, capite plumbeo: subtus dilutior, ventre medio cinerascente; crisso dilute rufo: cauda æneo-viridi, rectricibus quinque lateralibus albo late terminatis: long. tota 21·0, *alæ* 7·7, *caudæ* 9·0, *tarsi* 2·5.

Hab. Valle Dupar, on south side of the Sierra Nevada of S. Martha, at an elevation of 400 feet (*Joad*).

Mus. S.-G.

Obs. Similis *O. vetulæ*, sed crisso rufo et rectricum apicibus latius albis distinguenda.

Mr. Joad, F.Z.S., obtained two examples of this *Ortalida* in December 1863, during his expedition in the vicinity of S. Martha. Only one skin was preserved, which is now in the collection of Salvin and Godman.

maccalli, the ends of the tail-feathers are pure white; but in some skins from Vera Cruz they are quite as fulvous as in Guatemalan examples. Again, a skin from Yucatan, obtained by Dr. A. Schott in 1865, is in our opinion quite undistinguishable from the type of *O. maccalli*, so that it is not possible to draw a geographical line between the two forms. There is also a certain amount of variation in the ventral plumage in this species, some, particularly those from Vera Cruz, being strongly tinged with rufous.

Under these circumstances we are compelled to regard *O. vetula* as a widely extended and somewhat variable species, ranging from the Rio Grande on the north over the whole Atlantic slope of Central America as far as Honduras on the south. On the Pacific slope it is supplanted by the following species.

14. ORTALIDA LEUCOGASTRA.

Penelope albiventer, Less. 1842, p. 174; Gould, Voy. Sulph. Zool. p. 48, t. 31.

Penelope leucogaster, Gould, P. Z. S. 1843, p. 105.

Ortalida leucogaster, G. R. Gray, List of Gallinæ, p. 13; Sel. et Salv. Ibis, 1859, p. 224; Scl. P. Z. S. 1859, p. 391.

Chamæpetes leucogastra, Reich. Tauben, p. 142.

Penelopsis leucogastra, Bp. C. R. xlii. p. 877 (1856).

Bronzino-olivacea, pileo obscuriore; capitis lateribus et corpore subtus ad medium pectus plumbeis: abdomine toto pure albo: cauda æneo-viridi, rectricibus lateralibus albo terminatis: long. tota 16·5, *alæ* 7·3, *caudæ* 8, *tarsi* 2·5.

Hab. Realejo, Nicaragua (*Lesson*); Pacific slope of Guatemala (*Salvin*).

This Guan entirely replaces *O. vetula* on the Pacific slope of Central America, where, however, so far as we know, its range is confined between the frontier of Mexico on the north, and Realejo in Nicaragua on the south. Throughout the Costa Grande of Guatemala Salvin found it very abundant on the mountain-slopes from an elevation of about 3000 feet to the shores of the Pacific Ocean.

The pure white of the underparts of this species renders it easily distinguishable from its neighbouring ally *O. vetula*, though in habits no difference was noted. The eggs are white, with the surface somewhat roughened, as in other members of this family.

15. ORTALIDA GARRULA.

Phasianus garrulus, Humb. Obs. de Zool. i. p. 4.

Penelope garrula, Wagl. Isis, 1830, p. 1111.

Ortalida garrula, Wagl. Isis, 1832, p. 1227; G. R. Gray, List of Gall. p. 12.

Cineracescenti-ænea, pileo rufo: subtus valde dilutior, abdomine toto albo: remigibus externis castaneis: cauda obscure ænea, rectricibus quatuor extimis albo terminatis: long. tota 21, *alæ* 8·5, *caudæ* 9·5, *tarsi* 2·8.

Hab. Coast-region of New Granada, Magdalena valley (*Hum-*

boldt); Cartagena (*Barrot in Mus. Brit.*); Sta. Martha (*Verreaux in Mus. Brit.*).

Mus. Brit., Paris., Berol.

16. ORTALIDA CINEREICEPS.

Ortalida poliocephala, Scl. et Salv. P. Z. S. 1864, p. 371; Lawr. Ann. Lyc. N. Y. vii. p. 333, et ix. p. 139; Salv. P. Z. S. 1867, p. 161; v. Frantzius, Journ. f. O. 1869, p. 332.

Ortalida cinereiceps, G. R. Gray, List of Gall. p. 12; Salvin, Ibis, 1869, p. 318, et P. Z. S. 1870, p. 217.

Ortalida frantzii, Cab. Journ. f. O. 1869, p. 211.

Fuscescenti-ænea, pileo cinereo: subtus valde dilutior, abdomine cineracescenti-albo: remigibus externis castaneis: cauda obscure ænea, rectricibus lateralibus pallido cervino terminatis: long. tota 17, *alæ* 8, *caudæ* 8·7, *tarsi* 2·5.

Hab. Costa Rica (*Carmiol* et *v. Frantzius*); Veragua (*Arcé*); Panama (*M'Cleannan*).

Mus. Brit., Berol., Smiths., S.-G.

Obs. Præcedenti affinis, sed pileo cinereo nec rufescente distinguenda.

17. ORTALIDA ERYTHROPTERA.

Ortalida ruficeps, Sclater, P. Z. S. 1860, p. 289.

"*Ortalida erythroptera*, Natt.," Mus. Berol.; Licht. Nomencl. p. 87 (descr. nulla).

Æneo-viridis, capite undique cum gula summa, remigibus primariis et crisso castaneis: subtus cervina, pectore brunnescente, hypochondriis rufescentibus: cauda æneo-viridi, rectricum quatuor utrinque extimarum apicibus latius castaneis: long. tota 21, *alæ* 8, *caudæ* 10, *tarsi* 2·5.

Hab. in rep. Æquatoriali occidentali: Babahoyo (*Fraser*); Guyaquil (*Mus. Par.*).

Mus. Berol., Paris., et S.-G.

Mr. Fraser obtained four skins of this fine *Ortalida* at Babahoyo in 1859; but Sclater incorrectly referred it to *O. ruficeps* of Wagler, with which he was not then acquainted.

We were preparing to give it a new name, when Sclater found a specimen of the same bird in the Berlin Museum with a MS. name of Natterer's attached to it. Lichtenstein has given "Cumana" as the locality of this example; but Sclater ascertained on inquiry that the specimen in question had been received alive in one of the Royal Gardens, and had died in captivity, so that the locality assigned to it is not reliable.

In the Paris Museum there are two skins of this Guan obtained at Guyaquil by the expedition of the 'Danaïde' in 1843.

Subfam. III. OREOPHASINÆ.

Genus OREOPHASIS.

Type.

Oreophasis, G. R. Gray, Gen. of Birds, iii. p. 485 (1844). *O. derbianus.*

OREOPHASIS DERBIANUS.

Oreophasis derbianus, G. R. Gray, Gen. of B. iii. p. 485, pl. 121; Reichenb. Tauben, p. 155; Scl. et Salv. Ibis, 1859, p. 224; Salv. Ibis, 1860, pp. 43, 248.

Penelope fronticornis, Van der Hoev. Naturg. der Wirbelth. ii. p. 435.

Supra niger chalybeo-nitens: caudæ mediæ fascia lata alba: subtus albus, nigro anguste striatus: gula et ventre imo cum lateribus et tibiis nigris: rostro flavo: cornu verticali et pedibus rubris: long. tota 36, *alæ* 16, *caudæ* 15, *tarsi* 3·5.

Fem. *Mari similis, sed paulo minor, et cornu verticali minore.*

Hab. Guatemala, woods of the Volcan de Fuego, alt. 10,000 feet (*Salvin*).

Mus. Brit., Vindob., S.-G.

Sect. IV. *Geographical Distribution of the* Cracidæ.

The *Cracidæ* are strictly confined to the forests of the New World, and extend from the Rio Grande of Texas on the north to the wood-region of Paraguay on the south. They do not occur in the Antilles, with the exception of Trinidad and Tobago, and on the western side of the Andes do not pass southward of the Gulf of Guayaquil. Throughout the whole of this vast area the species are thinly distributed, not more than one member of the leading divisions (*Crax*, *Penelope*, and *Ortalida*) being usually found in the same locality. This fact of distribution is more strictly true than would appear from a cursory examination of the subjoined table. For instance, in Guatemala we find recorded the existence of two species of *Ortalida*. But one of these inhabits the western forests, and one the eastern; they are never found together. The same is, we believe, the case with the three Mexican *Ortalidæ*; and this fact is still more noticeable in the case of the true *Craces*, where each species appears to be confined to its own isolated area.

In the following table, which has been drawn up to show the distribution of the *Cracidæ*, we have divided the whole area occupied by the family into nine districts. We shall say a few words about each of them.

1. Mexico and Central America, from the Rio Grande of Texas down to the Isthmus of Panama.

In the whole of America north of Panama we find but one species of *Crax* occurring, viz. *C. globicera*. Of *Penelope* there are two species, *P. cristata* replacing *P. purpurascens* of Mexico and Guatemala in Costa Rica and Panama. The isolated *Penelopina nigra* is only met with in the elevated forests of Guatemala. In the same way *Chamæpetes unicolor* is peculiar to Costa Rica and Veragua. Five species of *Ortalida* are found northwards of Panama; but, as we have already explained, only one species occurs in each particular district. Lastly, the *Oreophasis* offers one of the most extraordinary instances of limited geographical distribution hitherto known, being absolutely restricted to the forest surrounding a single volcano.

Of the eleven Central-American species of *Cracidæ*, only one (*Penelope cristata*) is also met with south of Panama.

2. New Granada, *i. e.* the forests bordering the Magdalena river and its confluents and the northern littoral of the republic.

Of the *Cracidæ* of this district we have, probably, yet more to learn; but it is certainly rich in this as in other forms of tropical forest-life. The only *Crax* we have yet seen from the interior is *Crax alberti*. Bogotá collections also occasionally contain specimens of *Stegnolæma montagnii*, *Penelope cristata*, and *P. argyrotis*, *Pipile cumanensis*, *Aburria carunculata*, *Chamæpetes goudoti*, and *Ortalida guttata*. *Penelope greeyi* and *Ortalida garrula* are, as far as we know, restricted to the lower portion of the valley of the Magdalena*.

3. Forest-region of Western Ecuador.

From Western Ecuador we as yet know of only two species of *Cracidæ*—*Chamæpetes goudoti* and *Ortalida erythroptera*. It is quite evident that more remain to be discovered.

4. Northern littoral forests of Venezuela, Trinidad, and Tobago.

Crax daubentoni appears to represent its genus in the littoral wood-region of Venezuela, whence we have also seen specimens of three other species of *Cracidæ*, viz. *Penelope argyrotis*, *Pipile cumanensis*, and *Ortalida ruficauda*. *Pipile cumanensis* also occurs in Trinidad; and as *Ortalida ruficauda* is found in Tobago, it doubtless also inhabits the intervening island.

5. Guiana.

Guiana and the adjacent portion of the Amazonian basin as far as the Rio Negro is prolific in *Cracidæ*. The *Crax* is *C. alector*. *Nothocrax urumutum* is found on the islands of the Rio Negro. The two species of *Mitua* are both recorded by Schomburgk as found in British Guiana; and Natterer obtained *M. tomentosa* on the Rio Brancho. *Pauxi galeata* is a denizen of the forests of the Rio Casiquiari and Upper Orinoco. *Penelope marail* is the only species of the genus *Penelope* of the occurrence of which in this district we have certain evidence; and *Ortalida motmot* is likewise the single representative of its kind in this part of the world. *Pipile cumanensis* is also found in British Guiana.

6. Lower Amazonia up to Rio Madeira.

The mysterious *Crax pinima* is the only representative of its genus hitherto recorded from near Pará. *Mitua tuberosa* was found by Natterer in the same district. *Penelope pileata* is the only Lower-Amazonian species of *Penelope* of which we can speak with certainty. *Pipile cujubi* and *Ortalida araucuan* in like manner are the sole representatives of their respective genera in this district. Altogether there are certainly five species of *Cracidæ* inhabiting Lower Amazonia, and one (*P. jacupeba*) is uncertain.

7. Upper Amazonia, embracing the eastern slopes of New Granada, Ecuador, Peru, and Bolivia.

In Upper Amazonia the recorded number of *Cracidæ* is larger, embracing no less than eight species. *Crax globulosa* is the *Crax*

* To these must be now added *Pauxi galeata* (vide antè, p. 520) and *Ortalida ruficrissa* (vide antè, p. 538).

	I. Central America.	II. New Granada.	III. Western Ecuador.	IV. Venezuela.	V. Guiana.	VI. Lower Amazonia.	VII. Upper Amazonia.	VIII. S.E. Brasil.	IX. Paraguay.	Locality uncertain.
I. Cracinæ.										
1. Crax globicera	*									
2. —— alector	...	...	...	...	*					
3. —— sclateri	...	...	...	...	...	...	...	...	*	
4. —— globulosa	...	...	...	...	...	...	*			
5. —— daubentoni	...	...	...	*						
6. —— carunculata	...	...	...	...	...	...	...	*		
7. —— alberti	...	*								
8. —— pinima	...	...	...	...	...	*				
9. Nothocrax urumutum	...	...	...	...	*	...	*			
10. Pauxi galeata	...	*	...	...	*					
11. Mitua tuberosa	...	...	...	...	*	*	*			
12. —— tomentosa	...	...	...	...	*					
II. Penelopinæ.										
13. Stegnolæma montagnii	...	*								
14. Penelope purpurascens	*									
15. —— marail	...	...	...	...	*					
16. —— grecyi	...	*								
17. —— jacucaca	...	...	...	...	...	...	...	*		
18. —— jacupeba	...	...	...	...	...	...	...	*		
19. —— obscura	...	...	...	...	...	...	...	...	*	
20. —— cristata	*	*								
21. —— boliviana	...	...	...	...	...	...	*			
22. —— sclateri	...	...	...	...	...	...	*			
23. —— pileata	...	...	...	...	...	*				
24. —— ochrogaster	...	...	...	...	...	...	...	...	*	
25. —— superciliaris	...	...	...	...	...	...	...	*		
26. —— argyrotis	...	*	...	*						
27. Penelopina nigra	*									
28. Pipile cumanensis	...	*	...	*	*	...	*			
29. —— jacutinga	...	...	...	...	...	...	...	*		
30. —— cujubi	...	...	...	...	...	*				
31. Aburria carunculata	...	*								
32. Chamæpetes goudoti	...	*	*	...	...	...	*			
33. —— unicolor	*									
34. Ortalida motmot	...	...	...	...	*					
35. —— araucuan	...	...	...	...	...	*				
36. —— ruficeps	...	...	...	...	...	...	...	...	...	*
37. —— wagleri	*									
38. —— ruficauda	...	...	...	*						
39. —— canicollis	...	...	...	...	...	...	...	...	*	
40. —— albiventris	...	...	...	...	...	...	...	*		
41. —— squamata	...	...	...	...	...	...	...	*		
42. —— caracco	...	...	...	...	...	...	*			
43. —— guttata	...	*	...	...	...	...	*			
44. —— superciliaris	...	...	...	...	...	...	...	...	...	*
45. —— poliocephala	*									
46. —— vetula	*									
47. —— ruficrissa	...	*								
48. —— leucogastra	*									
49. —— garrula	...	*								
50. —— cinereiceps	*									
51. —— erythroptera	...	...	*							
III. Oreophasinæ.										
52. Oreophasis derbianus	*									
	11	12	2	4	8	5	9	7	4	2

of the district; but two other *Cracinæ* (*Nothocrax urumutum* and *Mitua tuberosa*) are likewise met with. The only *Penelope* we have seen from the Upper Amazon is *P. boliviana*; but *P. sclateri* is probably from the Bolivian branches of the same river. The widely spread *Pipile cumanensis* also occurs in more than one locality in this region. The *Ortalidæ* are *O. guttata* and *O. caracco*.

8. Wood-region of South-east Brazil.

In this and the following district, which are closely connected, and, as we believe, altogether divided from the great Amazonian forest-region by intervening campos, we meet with an entirely new set of *Cracidæ*. In the wood-region of Brazil, which we are now considering, *Crax carunculata* is the sole representative of the *Cracinæ*. Three species of *Penelope* occur—*P. jacucaca*, *P. jacupeba*, and *P. superciliaris*. *Pipile* is represented by *P. jacutinga*—very distinct from the two Amazonian species. Of *Ortalida* two species, at least, are met with:—*O. albiventris*, in the vicinity of Bahia; and the nearly allied *O. squamata*, probably in one of the more southern provinces. Of *O. ruficeps*, attributed to this district, we do not know the exact locality.

9. Paraguay and adjoining wood-region of the interior of Brazil, situate on the Upper Paraguay and Parana.

In this district *Crax sclateri*, *Penelope obscura*, and *Ortalida canicollis* represent their respective genera; but *Penelope ochrogaster*, discovered by Natterer near Cuyaba, probably also belongs to it.

June 23, 1870.

Professor Flower, F.R.S., V.P., in the Chair.

The following extract was read from a letter addressed to the Secretary by Dr. John Anderson, C.M.Z.S., dated Indian Museum, Calcutta, May 4th, 1870:—

"When I wrote to you about the Dolphin of the Irawady*, and mentioned *Globiocephalus*, I had not examined the specimen attentively, and had been misled by Blyth's identification of two almost similar specimens in this museum. But on going into the subject I found that he had confounded two very distinct forms, and had regarded as the young of his *Globiocephalus indicus* a small full-grown Dolphin (the *Phocæna brevirostris* of Owen). I have written fully on this subject in my 'Mammals of Yunan.'"

Mr. Howard Saunders, F.Z.S., exhibited and made remarks upon some nestlings of the Booted Eagle (*Aquila pennata*) from Southern Spain.

Dr. Murie read a memoir on the anatomy of the Walrus (*Tri-*

* See P. Z. S. *antea* p. 220.

chechus rosmarus). After a preliminary notice of the labours of Daubenton, Home, Von Baer, and others, he proceeded to treat on the outward characteristics of the young male *Trichechus* which the Society possessed in 1867. Dwelling respectively on the colour, general configuration, manner of walking, skin-folds, and head, he closed this section by a careful study of its pectoral and pelvic limbs as compared with those of *Phoca*. With a few remarks on viscera and genital organs, he more fully described the vascular channels and the vocal organs, verifying Von Baer's observation as to the diminutive size of the epiglottis. Of the myology nothing heretofore has been known save Sir Everard Home's incidental notice of the Walrus possessing well-developed interossei. Dr. Murie having dissected somewhat minutely the fleshy structures, proceeded to point out that though the genera *Trichechus*, *Otaria*, and *Phoca* manifest considerable variety in form, gait, and degree of limb-movement, they, nevertheless, muscularly present general agreement. In the presence of a coraco-brachialis, a flexor brevis manus, a pronator quadratus, an opponens pollicis, and a palmaris brevis, the Walrus is differentiated from the Eared and Earless Seals. Though deficient in concha, the auricular muscles are remarkably large. There is an external anconeus as in *Otaria*; and, as in it and *Phoca*, there are a double set of extensors of the manus. Compared with Seals, there are two extra peronei and a flexor brevis hallucis.

This paper will be published in full in the Society's 'Transactions.'

The following (5th and 6th) letters on the ornithology of Buenos Ayres*, addressed to the Secretary by Mr. W. H. Hudson, C.M.Z.S., were read:—

(No. V.)

"Buenos Ayres, March 22, 1870.

"My dear Sir,—In a letter, dated a few days back, I gave you some account of the *Tænioptera variegata*. This bird, a Plover in habits and a Thrush in appearance, finds a congenial habitat in this part of the country when the cold compels it to forsake the barren plains of Patagonia. Before winter sets in, the giant thistles that cover the plains in summer dry up and crumble to dust, and, the grass being eaten down very close by the innumerable flocks of sheep, the earth presents all the smoothness so agreeable and so necessary to this species.

"Even at night they do not seek for shelter, as do the Trupials, *Anthi*, and other passerine birds that roost on the ground, but, Plover-like, remain on the bare level places they frequent. I do not recollect ever having met them on the grassy pampas west of the Buenos-Ayres frontier. As they do not perch on reeds, they would naturally avoid such places, preferring the inhabited districts. Thus the settlement of the country has been favourable to this species, as it has to the Biscacha, the Burrowing-owl, and the *Téru-téru*.

* For Mr. Hudson's last letter, see P. Z. S. 1870, p. 332.

"The White Tæniopteras perch and roost in reeds and bushes; they avoid the open level ground, and frequent rough stubbles, reedy swamps, and plantations, also plains where the cardoon abounds. I have been told by old men that the *Tæniоptera coronata* was in this district a very common bird fifty years ago, when the long grasses had not been destroyed, and that they bred here. This is easy to believe; for as soon as we pass into the long-grass region this bird becomes quite common. I have met with great numbers of them 200 miles west of Buenos-Ayres city; and when outside the frontier I frequently noticed the *T. coronata* gathering from all sides and following our party, probably from curiosity, as human forms must have been strange to them in such a place.

"They have no regular migration, as they are seen at all seasons in the regions they inhabit; but in the settled districts, where there are none in summer, stragglers are always found in winter. Several years ago great numbers of them came; and it was amusing, on still mornings, to watch the dogs thrown into the greatest excitement by their long low whistling notes, sounding from all sides. From this peculiar note the bird is commonly called the *Buellero* (ox-driver).

"The *T. dominicana* much resembles the last in habits, but in winter goes in flocks. When flying it is a pretty bird, from the contrast of its black wings, tipped with white, with the pure white of its body. There are dull black and grey markings on the upper plumage of the young bird; but of all the adults I have shot, both in summer and winter, the plumage on the body of the male was entirely white, the upper plumage of the female a light grey. Some individuals breed in the vast reed-beds along the Plata; but as these are few, probably most of the flocks seen in winter visit us from more distant regions.

"The *Tæniоptera irupero* is smaller and much rarer than either of the preceding species. From its snowy-white plumage and jet-black bill, feet, and quill-tips, giving it a mourning appearance, it is called here *Viudita*, or 'Little Widow.' With the exception of a pair of these birds which I discovered last summer, it has always been in winter that I have met with them. A single individual sometimes appears in this season, and haunts the same spot during its stay, invariably alighting on the same tree or shrub and disappearing at the approach of spring. Still, I cannot say that it is a winter visitor; as it is so rare a bird at all times, it might easily escape observation in the laying-season without leaving the country.

"The three white Tæniopteras I have described perch on reeds and thistles, are fond of isolated shrubs, but avoid trees growing near together. They resemble each other closely in their feeding-habits. Like some Flycatchers they watch for insects from a stand, to which they frequently return after leaving it; but they do not, like the Flycatchers, watch for their prey in the air above and around them, but gaze down intently on the ground, as the Kingfisher does on the water. When they have discovered an insect they dart down and seize it, and proceed to kill and devour it on the spot, returning afterwards to their perch. When opened, their stomachs are found

to contain a large proportion of coleopterous insects. I think it very probable that the vast unexplored regions lying between the grassy pampas and the Andes will be found to be the native country of these birds. I haver never met here with any specimens of the *Tænioptera nengeta*.

"To see the webs of the Gossamer-Spiders floating in the air is here an exceedingly common thing. These little aëronauts are so numerous that on any still day in warm weather, if one sits down on the grass, he will observe numbers of them briskly moving about, while some, running to the point of a blade or leaf, suddenly dart out their invisible lines and float off. I recollect once, several years ago, the sky was for several days full of white masses composed of these floating webs. But this afternoon, while I was out shooting, these Spiders and their webs presented an appearance that was altogether new to me. Walking along a stream I observed skirting the edge of the low wet ground on the opposite side a broad white line. This I discovered to be caused by the quantities of gossamer that almost completely veiled the grass and thistles under it. This zone of gossamer was about twenty yards wide; and outside of it only a few scattered webs were visible. I did not ascertain its length, but followed it about two miles without finding its end. I enclose a small strip of the webs, which could be easily peeled off every object presenting a smooth surface. I observed many of the Spiders; indeed so numerous were they that they continually baulked each other in their attempts to rise in the air. There being a breeze blowing, as soon as one threw out his web it would be entangled in that of another. Both Spiders would immediately seem to know the cause of the trouble, for they would run angrily together, each trying to drive the other off. There appeared to be at least three different species of Spider. One of these had a round scarlet body; another, of a velvet-black, had a square large corslet and small pointed abdomen. But the greatest number were of the third kind; they were all shades of olive colour, from pale green to greenish black, and of various sizes, the largest being in body a quarter of an inch long. These Spiders could not have been brought by the wind, as the zone of webs followed the windings of the stream, but had probably bred in the low ground along its margin and had now gathered on its edge ready to migrate.

"27th. On the 25th I went to visit the Spiders I have spoken about, fully expecting they would be gone, as we have had wind and rain since I first saw them. To my surprise they were vastly increased in number; on the tops of cardoons they literally were in heaps. Most of them were large and of the olive-coloured species, and were floating off in great numbers, the day being calm. I noticed another kind, of a pale slate-coloured body elegantly striped with black, and pink legs. On the 26th I went again to see them; and the whole army of Spiders, save a few solitary stragglers, had disappeared.

"Very truly yours,

"WILLIAM H. HUDSON."

(No. VI.)

" Buenos Ayres, April 11, 1870.

" My dear Sir,—The Blackbirds, *Pajaro negro* (*Molothrus bonariensis*), with characteristic irregularity, often leaving us at the end of March, apparently for good, have again appeared this year in great numbers. When summer is over these birds congregate in vast flocks, and are then seen for many days flying north ; but it is not probable that they migrate to any very great distance. They pass with a rapid, low, undulating flight, one flock behind the other, their wings producing a soft and agreeable sound. The Blackbirds feed on the ground, following the plough in spring to pick up the worms, and are fond of keeping round cattle in the pasture, frequently alighting on their backs. The song of the male is, when wooing, accompanied by strange gestures and actions. Swelling and ruffling his feathers like a turkey-cock, and frequently suddenly taking wing and flying directly away from the female, and performing a wide circuit round her in the air, he sings all the time. The song begins with remarkable hollow, internal notes, ending with others loud and clear. The female is homely in appearance in her dull mouse-coloured suit, and has no song but a low chattering, not often uttered, and always appears very indifferent to the advances of her beautiful glossy partner. In the evening, when they settle on the trees to roost, they sing until it is quite dark. From their great numbers, their singing at such times often sounds like the rushing of a strong wind among the trees. When disturbed on their roost at night the males repeat their song as they take wing; they also settle on the trees on rainy days to sing, continuing their concert for hours. One of our marsh-Blackbirds, the *Chrysomus frontalis*, possesses this habit of singing while it is raining; its song begins with a low mourning note, to which succeeds a long, soft, plaintive whistle; this is followed by others, short and in rapid succession as they rise, growing longer as they sink again, until they die away. This song heard in wet and gloomy weather has an indescribably sweet and melancholy effect. But to return to the common Blackbird; the most remarkable thing about this bird is its manner of reproduction; and this would be a very interesting subject of study to the philosophic naturalist. It is well known that, like the European Cuckoo, it deposits its eggs in the nests of other birds. But the Cuckoo lays but one egg in a nest, and its peculiar habit possesses one thing in common with the instincts of other animals; it is regular and definite, ensures the safety of the young, and, for all that has yet been established to the contrary, is unchangeable as are the laws of matter and force. The instinct of the Blackbird is, on the contrary, unsettled and indefinite and truly a 'monstrosity.' It is as if the true instinct had been partially eradicated or disfigured, so that its traces appear in various modes and degrees of intensity in different individuals—strong enough, though deformed, in some to secure the safety of the young, in others so dim and uncertain as to make reproduction impossible. Had Darwin been well acquainted with the habits of this bird he

certainly would have given it a distinguished place in the 'Origin of Species;' and he could not have found any more remarkable case for illustrating the 'mistakes and imperfections to which instinct is liable,' and which he considers favourable to his theory.

"There are few small birds here into whose nests the female Blackbird does not intrude; and great is the domestic confusion introduced by her visits. She does not choose nests for their size or for their architects being hard or soft-billed birds, but lays her eggs indiscriminately wherever she can. I have never found her eggs in the nest of the *Churinche* (*Pyrocephalus rubineus*), probably because that pugnacious little bird remains by it and is able to beat her off. I have also observed that the Blackbird never lays in domed nests, though parties of them are constantly seen about the *ovens* of the Oven-bird (*Furnarius*), climbing over, peering into, and even entering and examining them very curiously. It would be difficult to enumerate all the little birds who are compelled to rear the young Blackbirds; but their favourite nests, probably because easiest discovered, and undefended against their intrusion, are those of the *Cachila* (*Anthus correndera*), the *Chingolo* (*Zonotrichia pileata*), the *Jilguero* (*Chrysomitris barbata*), the *Tijereta* (*Milvulus violentus*), and the Yellow-breast (*Pseudoleistes virescens*).

"The nests of the last two are particularly preferred; indeed I seldom find a nest of either of them but it contains more eggs of the Blackbird than of the rightful owners, while from one or two to half a dozen female Blackbirds are usually to be observed near it.

"They frequently begin depositing their eggs before the nest is finished, upon which it is generally abandoned; and often so many eggs are laid in a nest, that, even if they are set on, few or none of them can be hatched. The nest of the *Tijereta* is usually found with from five or six to a dozen Blackbird's eggs in it, that of the Yellow-breast, which is deeper, with from fifteen to twenty; but what the nest contains are seldom all the eggs that have been laid in it; for, by looking on the ground under the tree or bush, many more will frequently be discovered, thrown down by the female Blackbird. Another destructive habit of this bird (destructive to its own increase as well as to that of other species) is its habit of pecking holes in the eggs it finds in the nest where it lays. This is not a fixed, invariable habit, but irregular, as are its reproducing-instincts. Sometimes the shells are so broken that the yelk is spilt in the nest; at other times they peck small holes in the shells; and sometimes they strike their bill into one egg and fly away with it, as a Pigeon does with the shell of an egg it has just hatched. This I have seen them do; and I have often found an egg with a hole in it several feet from the nest, doubtless removed in this way. Some nests are found containing a dozen or twenty eggs, every one with holes pecked in them. In the laying-season each female is generally attended by one or two, and sometimes three males, who quietly remain near while she is on the nest. The Blackbird also drops its eggs on the ground; and I continually find these lost eggs on ploughed fields, roads, and spots of barren earth.

"I do not know that these birds ever make a complete nest; but that they sometimes commence to build one I am certain. I once observed a flock of seven or eight Blackbirds busily flying to and from a clump of young giant thistles. On going to the spot, I found they had begun to build a large nest on a broad, horizontal leaf, very much exposed to sight. No other bird would have chosen such a frail foundation to build upon; for, however large and stiff these leaves are, they rapidly shrink up as the plant grows; and this one would certainly have dropped its burden within ten or fifteen days. The nest was made in a very slovenly manner, being composed of large sticks, rags, and other things, piled without any regularity; the birds fluttered round as if anxious for its safety while I examined it, and resumed their work as soon as I withdrew; but after two days they suddenly forsook it. I have since observed another flock of Blackbirds begin a nest, in a poplar tree; but this was also left unfinished.

"In autumn, when the Blackbirds congregate in flocks of tens of thousands, so that the ground where they feed seems carpeted with black, and the trees where they alight to have a black foliage, I often wonder that the little birds in whose nests they lay do not become extinct, or all but extinct, by their means. Though I have been familiar with this bird since I was a child, when I used to find its 'lost and wasted eggs' on the walks, and remove them in pity from the nests of little birds, I have not yet ceased to wonder at its habits. How strange that it should be so disorderly in the midst of the general order of nature! Or must we come to consider these habits of the *Molothrus bonariensis* 'not as especially endowed or created instincts, but as small consequences of one general law,' namely, transition?

"Truly yours,

"WILLIAM H. HUDSON."

The following papers were read:—

1. On some recent Additions to the Avifauna of Mexico. By P. L. SCLATER, M.A., Ph.D., F.R.S., and OSBERT SALVIN, M.A., F.L.S., &c.

A series of birdskins recently submitted to our examination by M. A. Boucard, of Paris, contains some examples of Mexican birds, obtained by one of his correspondents in Southern Mexico, which have not previously come under our notice in collections from that country. There are five species, concerning which we have the following notes to communicate:—

1. TURDUS FLAVIROSTRIS, Sw.

An adult female of this fine Thrush from San Juan del Rio, a town in the centre of the state of Oaxaca. It appears to be a western species exclusively.

2. GEOTHLYPIS MELANOPS, Baird, B. N. A. i. p. 241.

A fully adult male of this *Geothlypis*, which Prof. Baird has recently separated from *G. trichas*. The exact locality of the specimen is not given. Sclater's collection contains a similar example from some part of Mexico, hitherto confounded with *G. trichas*. There can, we think, be no doubt of the validity of this species, which (as Prof. Baird also notes, *l. c.*) is quite distinct from *G. speciosa*, Sclater. Of the last-named bird, Sclater's typical specimens are still unique.

3. THRYOTHORUS PLEUROSTICTUS, Scl. Cat. A. B. p. 21, pl. iv.

This species has not before been sent from Mexico, and only one (the type) specimen from Guatemala. Several examples, however, have been forwarded from Costa Rica during the last few years.

4. CYANOSPIZA LECLANCHERI.

Passerina (Spiza) leclancheri, Lafr. Rev. Zool. 1841, p. 260, et Mag. de Zool. 1841, Ois. pl. 22.

Spiza leclancheri, Bp. Consp. i. p. 475.

A pair of this charming species from San Juan del Rio; the first we have yet met with.

Lafresnaye described and figured the male of this Finch from an example obtained by M. Leclancher, one of the officers of the 'Venus,' during the expedition of that vessel, near Acapulco. The female does not differ materially from the male, except that the coloration of the plumage is of a less brilliant tint.

5. MOROCOCCYX ERYTHROPYGIA (Less.): Scl. Cat. A. B. p. 322.

One skin of this Cuckoo from San Juan del Rio; the first Mexican specimen met with, except an example in the Museum of the Academy of Natural Sciences of Philadelphia, U. S. A. (examined by Sclater in 1856), which was procured near Mazatlan by Mr. Bell of New York.

2. Notes on *Gracula kreffti*.

By JOHN BRAZIER.

During my visit to the Solomon Islands along with my friend Sir William Wiseman in September 1865, we obtained six living examples of the Grakle recently described by Mr. Sclater (P. Z. S. 1869, p. 120) as *Gracula kreffti* at Ysabel* or Isabel Island (as some writers please to call it). This was the only island in the group in which we met with it. These birds were bought of the natives. On my visit to the mountains I saw plenty of the same species, but I found it impossible to get within gun-shot of them. This Grakle is a bird that is almost always on the wing, and frequents the mountains of the island, never the low land. How the natives take them alive is a question. When in captivity they soon become tame. The natives bring them off

* In Mendana's 'Voyages' it is called Santa Ysabel.

on a hoop tied with a string to one of their legs. When brought on board they were fed with boiled rice and table-raisins, and throve exceedingly on their new food. While we remained in the Tropics the birds were in good health, but when we got into colder latitudes began to fail. When we arrived in Sydney two were presented to the Zoological Collection in the Botanic Gardens, but died in about a week's time. So far as I can remember, our own all died at last and were taken to London in skins when the 'Curaçoa' returned to Portsmouth. There has been a specimen of the same bird in the Sydney Museum for years; but no name nor locality was attached until this last month or so.

3. On a Collection of Birds from the Island of Trinidad. By Dr. Otto Finsch, C.M.Z.S.

Mr. Kohlmann, a schoolmaster of Vegesack, has kindly placed in my hands for determination a collection of birds from the Island of Trinidad, brought home by a captain of a vessel belonging to this small port on the Weser.

Though birds of this well-explored island* are rather common in collections, the first account of its rich avifauna did not appear before 1864, when Mr. E. C. Taylor (Ibis, pp. 73–97) published his interesting article (Five Months in the West Indies. Part I. Trinidad and Venezuela), enumerating 141 species, chiefly belonging to the Island of Trinidad. Two years later we got a work specially devoted to the birds of this island from the pen of Dr. A. Léotaud†, a French ornithologist, whose praiseworthy zeal and intelligence manifested signs of still greater progress, but who, unfortunately, died scarcely one year later (*vide* Ibis, 1867, p. 256). From my acquaintance with this work, which was "publié par souscription nationale," I am enabled to say that it is one of the best of its sort ever published in a country where the sources of science are more than usually meagre, and where especially bibliographical material is by no means near at hand. Nobody, therefore, will feel inclined to criticise the author for being here and there mistaken in the correct appellation of the species, and still less since the descriptive portion of the work and the accurate measurements prove him to have been throughout an excellent practical observer.

Dr. Sclater has already corrected some of the errors in his valuable remarks on Dr. Léotaud's book (Ibis, 1867, pp. 104–108); and in the course of the following pages I shall be able to add some further corrections. The results of my endeavours will be, I believe, of

* A brief sketch of its avifauna has been given already by Dr. Hartlaub; Über den heutigen Zustand unserer Kenntniss von Westindiens Ornithologie (Isis, 1847, p. 614).

† Oiseaux de l'ile de la Trinidad (Antilles); par A. Léotaud, Docteur en Médecine de la Faculté de Paris, Membre Correspondant de la Société de Médecine de Gant. Port d'Espagne: Chronicle Publishing Office, 1866.

some interest, as I have compared the specimens received from Trinidad with others from different parts of America, especially of the neighbouring mainland of Venezuela and Guiana. The total number of species recognized as found in Trinidad by Dr. Léotaud is 297—a number evidently too low, because Dr. Léotaud apparently enumerates only those species met with by himself. If he had had an opportunity of consulting other reliable works on South-American ornithology besides the few cited by him, he would have found a considerable number of species to add to his list. The valuable Catalogue of American Birds in the collection of Dr. Sclater (1862) contains thirty species from Trinidad not included in Dr. Léotaud's work. Mr. Taylor notices thirteen species more, and I myself am able to add ten additional species; so that the total number of species now amounts to about 350. Further investigations will most probably increase this number; for Trinidad, situated close to the mainland, and being "nothing more or less than a bit of Venezuela," as Dr. Sclater very aptly remarks, undoubtedly becomes visited accidentally by many birds proper to the continent, besides a portion of stragglers from the northern parts during the winter season. The only species peculiar to the avifauna of Trinidad seems to be *Psittacula cingulata*.

The collection received by Mr. Kohlmann contains 115 species, of which the following are new to Trinidad:—*Heleodytes minor*, *Myiozetetes inornatus*, *Sturnella hippocrepis*, *Pseudoleistes melanicterus*, *Icterus vulgaris*, *Cardinalis phœniceus*, *Sycalis brasiliensis*, *Ramphastos erythrorhynchus*, *Pteroglossus araçari*, and *Brotogerys tuipara*.

The Catalogue of Dr. Sclater contains the following species marked with Trinidad:—

	Sclater, Cat. page
Mimus melanopterus, Lawr.	9
Heleodytes griseus (Sw.)	16
Thryothorus rufalbus, Lafr.	20
Anthus breviunguis, Spix	24
Euphona flavifrons (Lath.)	56
Calliste cayana (L.)	66
?*Tanagra glaucocolpa*, Cab.	75
Arremon silens, Bp.	93
Orchesticus ater (Gml.)	98
Emberizoides macrourus (Gml.)	118
Chrysomitris cucullata (Sw.)	123
Sycalis columbiana, Cab.	126
Icterus auricapillus, Cass.	132
Sturnella meridionalis, Scl.	139
Synallaxis albescens, Temm.	150
Phacellodomus frontalis (Licht.)	154
Picolaptes squamatus (Licht.)	166
Pyriglena maculicaudis, Scl.	185
Pitangus rufipennis, Lafr.	222
Pyrocephalus rubineus (Bodd.)	227

	Sclater, Cat. page
Myiarchus ferox (Gml.)	233
Pachyrhamphus cinereus (Bodd.)	241
Chiroxiphia lanceolata (Wagl.)	251
Bucco bicinctus, Gould	271
Chelidoptera tenebrosa (Pall.)	275
Florisuga flabellifera, Gould	295
Coccyzus pumilus, Strickl.	323
Conurus cyanopterus (Bodd.)	350
Chrysotis festiva (L.)	354
Psittacula cyanoptera (Bodd.) (*passerina*, L.)	357

Mr. E. C. Taylor notices the following species obtained by himself in Trinidad:—

	Taylor, Ibis, 1864. page	Sclater, Cat. page
Tinnunculus sparverius (L.)	80	—
Turdus fumigatus, Licht.	80	4
Campylorhynchus nuchalis, Cab.	80	17
Chlorostilbon atala (Less.)	92	318
Spermophila intermedia, Cab.	83	103
Phyllomyias semifusca, Scl.	86	214
Camptostoma imberbe, Scl.	86	215
Elainea pagana (Licht.)	86	216
Contopus bogotensis, Bp.	87	231
Pachyrhamphus albogriseus, Scl.	87	242
Dryocopus erythrops, Valenc.	93	333
Chamæpelia albivitta, Bp.	94	
Crax alector, L.	95	

Order ACCIPITRES.

Fam. FALCONIDÆ.

BUTEONINÆ.

1. HYPOMORPHNUS GUNDLACHI, Cab. J. f. Orn. 1854, Extrah. p. lxxx.

Morphnus urubitinga, Lembeye (nec Gmel.), Aves de Cuba, pl. 3. f. 3 (med.).

Astur unicinctus, Léot. (nec Temm.) p. 44.

One specimen in old plumage.

Long. al.	caud.	rostr. (cera excl.)	a rict.	tars.	dig. med.*
15″	7″ 10‴	13‴	19‴	3″ 1‴	1″ 10‴

Dr. Léotaud erroneously inserts this species as *Astur unicinctus*, Temm., a perfectly distinct species.

Our specimen agrees very well with the description given by Dr. Cabanis, but is apparently more advanced in age. The whole plumage is dark brownish black; the feathers on the upper part of the

* The measurements are given in old French inches and lines.

interscapulium are rufous at the base; the upper and under tail-coverts are margined narrowly with white; the tail has a broad white cross band, above this is another much narrower and not quite complete, a third, still narrower and ill-defined, is placed at the base and hidden by the tail-coverts; the tail-feathers are tipped with white; the under surface of the wings shows a white space, formed by the white basal third of the first four primaries, but this white is speckled very minutely with greyish black, as in *H. anthracinus*; the secondaries bear on the middle portion of the inner web six or seven cross bands of pale rufous brown, somewhat ill-defined and mixed and washed with dark brown, giving a somewhat marmorated appearance.

This species is closely allied to *H. anthracinus*, Licht., but may be easily distinguished by the two white bands on the base of the tail, besides the white middle cross band.

2. LEUCOPTERNIS ALBICOLLIS (Lath.); Pelz. Geier und Falken (1862).

Asturina albicollis, Schleg. Asturinæ, p. 9.
Buteo pœcilonotus, Léot. p. 7.
Buteo albicollis, Taylor, *l. c.* p. 79.

One specimen in full dress, agreeing with the excellent description given by Dr. Léotaud.

Long. al.	caud.	rostr.	a rict.	tars.	dig. med.	ung.
14″	8″	12‴	18‴	3″ 3‴	2″	9‴

AQUILINÆ.

3. SPIZAËTUS ORNATUS (Daud.); Schleg. M. P.-B. *Astures*, p. 2 (syn. part.); Léot. p. 10.

Two specimens of this fine species:—one in the well-known plumage of the old bird, as described by Prince Max, Dr. Léotaud, and others; the other in the very different plumage of the younger stage, of which I cannot find any description. I therefore add a detailed account of this specimen.

Head, neck, upper portion of the interscapulium, and all the under-parts white, tinged faintly with pale ochre on the sides of the head and neck; the sides of the belly and the under wing-coverts with large cordiform black spots, as in the old bird, the feathers on the femur and tarsus likewise barred transversely with white and black; shoulders, wings, and tail dark brown, and marked with darker bars as in the old bird, but not so distinct; the tail with six broad cross bands of brownish black; the upper quill-coverts margined with white at the point, as in the adult; on the occiput there is a considerably long crest, composed of some black, brownish, and whitish feathers, which are strongly worn off, showing that the bird is not a very young one; on the hind neck some feathers of a rufous brown, as in the old bird, which indicate evidently that these parts are assuming the colouring of the adult.

Long. al.	caud.	rost.	a rict.	tars.	dig. med.	ung.	
14½″	9¾‴	14‴	19‴	3″ 3‴	2″ 0‴	12‴	(ad.)
14¾	10¼	13	20	3 4	2 2	12	(jun.)

Professor Schlegel is certainly wrong in considering *S. braccatus*, Spix (Des Murs, Icon. pl. 67; *S. tyrannus*, Neuw.) to be "l'oiseau dans la première livrée" of *S. ornatus*.

Falconinæ.

4. Falco columbarius, L.; Schleg. Mus. P.-B. *Falcones*, p. 19.

Hypotriorchis columbarius, Léot. p. 26.

One male in young plumage, resembling in every respect the young of our *F. æsalon*, except that the tail has five rusty cross bands instead of seven as in *F. æsalon*. The latter species seems to be also distinguished by having considerably longer wings.

Long. al.	caud.	rostr.	tars.	dig. med.	
6″ 10‴	4″ 0‴	5½‴	14‴	13‴	(♂ jun., Trinidad.)
7 1	4 5	5½	14	14	(♂ ad., N. America.)
8 0	4 10	6	17	14	(♀ ad., Cuba.)
7″ 4‴–7 9	4″ 1‴–4 6	5–6	15–16	12–13	(*æsalon*, 3 males.)

5. Falco sparverius, L.; Schleg. *Falcones*, p. 30.

Tinnunculus sparverius, Pelz. Geier und Falken (1863), p. 627; Taylor, *l. c.* p. 80.

A young male agreeing entirely with specimens from Texas and California (Cape St. Lucas: *Xantus*).

Dr. Léotaud does not include this widely distributed species; but Mr. Taylor notices—"Occasionally seen in Trinidad, but much less common there than in the Antilles Islands."

6. Harpagus bidentatus (Lath.); Burm. ii. p. 100; Léot. p. 28.

An old one and two in change of plumage, having the underparts white, with longitudinal black shaft-stripes; in one the flanks bear cordiform brown spots.

Accipitrinæ.

7. Asturina nitida (Lath.); Taylor, *l. c.* p. 80.

Astur nitidus, Léot. p. 46.

One specimen in the very different and curious first year's plumage, as described by Dr. Léotaud (p. 47).

Milvinæ.

8. Cymindis cayennensis (Gmel.); Schleg. Mus. P.-B. *Pernes*, p. 9; Léot. p. 34.

A young specimen, brown above, below white, with black shaft-stripes; tail with four black and four brown cross bands.

We possess this species from Brazil and Guatemala.

9. CYMINDIS UNCINATUS, Ill.; Schleg. Mus. P.-B. *Pernes*, p. 8; Léot. p. 36.

One specimen in the dress of the younger bird, as described by Dr. Léotaud (p. 38).

CYMINDIS PUCHERANI, Léot. p. 40.

Very probably this species is identical with *Falco vitticaudatus*, Neuw. (Beitr. p. 178; *Cymindis vitticaudus*, Pelz. i. p. 6), which Professor Schlegel declares to be nothing more than a black variety of *C. uncinatus* (Mus. P.-B. *Pernes*, p. 8). It has certainly nothing whatever to do with *Urubitinga anthracina* or *U. schistacea*, as Dr. Sclater suggests (Ibis, 1867, p. 107), but is a true *Cymindis* (tarsus $13\frac{1}{2}'''$!).

10. GAMPSONYX SWAINSONI, Vig.; Burm. ii. p. 114; Léot. p. 41.

Two specimens of this widely distributed species, agreeing with specimens from Northern Brazil (Ceará).

Fam. STRIGIDÆ.

11. ATHENE INFUSCATA (Temm.).

Glaucidium passerinoides (Temm.); Burm. ii. p. 143.
Athene phalænoides, Léot. p. 55.
Glaucidium infuscatum et *phalænoides*, Cab. J. f. Orn. 1869, pp. 207, 208.
Glaucidium ferrugineum, Taylor, Ibis, 1864, p. 80.

One specimen, which I am not able to distinguish from Brazilian specimens.

12. SCOPS BRASILIENSIS, Briss.

Scops decussata, Burm. ii. p. 126.
Ephialtes portoricensis, Léot. p. 57.

One specimen, agreeing with Brazilian specimens.

13. SYRNIUM TORQUATUM (Daud.).

Athene torquata, Léot. p. 52.

One specimen.

Order PASSERES.

Fam. CAPRIMULGIDÆ.

14. NYCTIBIUS JAMAICENSIS, Gmel.; Scl. P. Z. S. 1866, p. 129.

Nyctibius pectoralis (Gould); Léot. p. 70; Taylor, p. 90.

One specimen, tinged more strongly with rufous brown than in a Brazilian specimen before me, but evidently of the same species, which varies a good deal, as mentioned by Dr. Sclater.

Long. al.	caud.	rostr.	rostr. a rict.	dig. med.
9″	6″ 6‴	$6\frac{1}{2}'''$	19‴	8‴

15. CHÆTURA POLIURA (Temm.); Buff. Pl. Enl. 726. f. 2.

Acanthylis brachyura, Jard.
Chætura poliura, Scl. P. Z. S. 1865, p. 611 (syn. part.).
Acanthylis poliurus, Léot. p. 86.
Chætura brachycerca, Scl. & Salv. P. Z. S. 1867, p. 758, t. 34 (opt.).

One specimen, in every respect agreeing with the description and figure published recently by Dr. Sclater and Mr. Salvin from specimens sent from Eastern Peru, and supposed to belong to a new species. In comparing it with the description of *A. brachyura*, Jard. (Ann. and Mag. N. H. vol. xviii. 1846, p. 120), I was strongly inclined to believe in the identity of both "short-tailed Swifts;" but, unfortunately, Sir William Jardine does not mention the colour of the under tail-coverts. Being, therefore, unable to settle the question by means of positive evidence, I wrote to Dr. Sclater; and he most kindly gave me the following answer:—"You are right in considering *C. brachycerca* to be identical with *C. brachyura*, Jard.; I possess one of the Tobago specimens. But now I find that it is the true *Cypselus poliurus* of Jamaica, founded on Buffon's Pl. Enl. 726. f. 2; so I call the species *Chætura poliura*, while the Brazilian species must be *C. cinereicauda*, Cass." *

C. poliura, as the species must be named, is easily distinguishable from the nearest allied species, *C. cinereicauda*, Cass., in having the upper as well as the under tail-coverts brownish grey; the tail-feathers darker, the shafts black, projecting about 1‴; the upper tail-coverts reach nearly to the end of the tail.

Long. al.	caud.	culm.	rict.	tars.
4″ 7‴	1″ 1‴	1¾‴	4¼‴	5‴

Fam. CORACIADÆ.

16. PRIONITES SWAINSONI (Scl.).

Prionites bahamensis, Sw.
Momotus bahamensis, Léot. p. 96.
Momotus swainsoni, Scl. Cat. p. 261; Taylor, Ibis, 1864, p. 88.

One old specimen.

Fam. TROGONIDÆ.

17. TROGON MERIDIONALIS, Sw.; Sclat. Cat. p. 276.

Trogon sulphureus, Léot. (nec Spix), p. 101.
Aganus violaceus (Gmel.), Cab. et Heine, Mus. Hein. iv. p. 190.

Male and female, very accurately described by Dr. Léotaud.

Long. al.	caud.	rostr. a fron.	rostr. a rict.	tars.	
4″ 4‴	4″ 2‴	7‴	10½‴	5½‴	(♂)
4 2	4 1	6½	10	5	(♀)

Dr. Cabanis notices the length of wing 4″ 7‴, that of tail 5″ 2‴; but Dr. Léotaud measures the wings also 4″ 3‴.

* *Cf.* Mr. Sclater's remarks on this subject, *antèa* p. 329.—ED.

18. TROGON VIRIDIS, L.; Scl. Cat. p. 275; Léot. p. 98; Taylor, Ibis, 1864, p. 88.

Aganus viridis, Cab. et Heine, Mus. Hein. iv. p. 196.

One specimen, in the plumage of the old male as described by the Prince of Neuwied and Dr. Léotaud, and agreeing in every respect with a specimen from Brazil.

Long. al.	caud.	rostr.	rostr. a rict.	tars.	
5″ 3‴	5″ 1‴	8½‴	11½‴	6½‴	(Trinidad.)
5 7	5 4	8½	12	—	(Brazil.)
5 7	5 9	9	12	7	(♂, Cayenne.)
5 1	5 1	8½	11	—	(♀, Cayenne.)
5 2	5 11	8	11½	6	(♂, jun. Guiana.)

Both have the six middle tail-feathers of a dark metallic green, with scarcely any tinge of bluish; the rump and upper tail-coverts darker metallic green, with bluish reflexions. A young male from Demerara has the tail-feathers black, only the two innermost with green reflections on the outer web; the outer tail-feathers are barred white and black at the apical half, like those of the female.

We possess an old male from Cayenne, which shows a very peculiar difference (as far as I know, not yet mentioned by any describer), viz. in having the tail-feathers, instead of green in every light, with a dark indigo-blue lustre, and the greater part of the uropygium and upper tail-coverts vivid dark purplish blue. If new, *T. cyanurus*, Hartl.; otherwise it agrees in every respect.

19. TROGON COLLARIS, Vieill.; Scl. Cat. p. 276; Léot. p. 103 (descr. opt.); Taylor, *l. c.* p. 88.

Trogon curucui (L.); Cab. et Heine, Mus. Hein. iv. p. 176.

One specimen, not different from a specimen from Surinam in the Bremen collection.

T. curucui, Linné, based upon the description of Marcgrave and Brisson, is most probably this species, but cannot be made out with certainty. The white and black bars on the three outer tail-feathers, as described by Brisson, are very well referable to this species; but he does not mention the white cross band which separates the golden green of the jugulum and the scarlet of the breast.

The figure of *Trogon curucui* by Hahn (Vög. aus As. Afr. Am. &c. Liefer. vii. t. 3) belongs undoubtedly to this species, and not to *T. melanurus*, Sw., as concluded by Dr. Cabanis (Mus. Hein. iv. p. 201).

Long. al.	caud.	rostr.	a rict.	tars.	
4″ 3‴	4″ 10‴	6½‴	9½‴	7‴	(Trinidad.)
4 5	4 8½	6	10	—	(Surinam.)
4 5	4 6	6½	—	—	(ap. Léot.)

A very good description of this species is given by Dr. Léotaud.

I append a remark on *Trogon atricollis*, Vieill. (Enc. Méth. p. 1361; Gal. Ois. i. p. 17, t. 31), with which Dr. Cabanis (Mus. Hein. iv. p. 181) unites *T. chrysochlorus*, Natt. (Pelz. Sitzungsb. der math. naturw. Classe der Kais. Ak. d. Wiss. in Wien, vol. xx. 1856, p. 496), a species distinguished chiefly by its larger size. The Imperial Museum of Vienna possesses fifteen specimens of this large form from Ypanema in Southern Brazil, and nine specimens of the true *T. atricollis* from the north of Brazil (Borba, Marabitanas, Barra do Rio Negro), all collected by the late Johann Natterer. Von Pelzeln, in his valuable publication on Natterer's collections, still insists on the specific separation of the two species; and, as far as I can judge, he is right. We possess one specimen of the true *T. atricollis* from Guiana (Demerara), which is much inferior in size to the measurements noticed of *T. chrysochlorus* by von Pelzeln. I therefore incline to believe that the *T. (Pothinus) atricollis* described by Cabanis belongs to *T. chrysochlorus*, as well as *T. atricollis* of Neuwied (iv. p. 309) and Burmeister (ii. p. 279). But to settle this question finally further researches are necessary.

Fam. Alcedinidæ.

20. Ceryle americana (Gmel.); Léot. p. 112.

Chloroceryle americana, Scl. Cat. p. 265; Taylor, *l. c.* p. 88.

A female of this widely distributed species, agreeing with specimens from New Granada in the Bremen collection.

21. Ceryle superciliosa (L.); Léot. p. 115.

Chloroceryle superciliosa, Scl. Cat. p. 265; Taylor, *l. c.* p. 88.

One specimen.

Fam. Cœrebidæ.

22. Dacnis atricapilla (Vieill.).

Chlorophanes atricapilla, Scl. Cat. p. 52; Taylor, *l. c.* p. 81.
Dacnis spiza, Léot. p. 122.
Chlorophanes guatemalensis, Scl.

Six males and one female.

In comparing these specimens with others from Brazil, New Granada, and Guatemala (Vera Paz), I must consider them all to belong to one and the same species, having convinced myself that there is no real constancy in the characters by which Mr. Cassin separated four local varieties or races, although there exists a considerable variability in respect of the green of the plumage, as well as in size. Two males from Trinidad are as bright green as our Guatemalan one; and a specimen from South Brazil (St. Catharina), collected by Burmeister, jun., differs very much less, having the bill nearly as large as the stout-billed specimens from Guatemala. Columbian specimens are not distinguishable from Trinidad ones; others from Trinidad are as dark green as others from Brazil.

Long. al.		caud.	rostr.	a rict.	tars.	
2″ 8‴–2″	10‴	20–22‴	6–7‴	8–9½‴	8‴	(♂ ♂, Trinidad.)
2	7	20	6½	8	8	(♀, Trinidad.)
2	7½	21	6	7½	7½	(♂, Columbia.)
2	5	—	5½	7	—	(♀, Columbia.)
2	7	18	5½	—	7	(♂, Brazil.)
2	6	21	6¾	8½	8	(♂, Brazil, St. Catharina.)
2	9½	22	7½	9	8	(♂, Guatemala.)
2	8	21	7	8½	8	(♀, Guatemala.)

23. DACNIS CAYANA (L.); Scl. Cat. p. 50; Léot. p. 124; Taylor, *l. c.* p. 81.

One specimen in the dress of the old male, not different from specimens from Guiana (Demerara) and Brazil.

24. CŒREBA LONGIROSTRIS (Cab.).

Arbelorhina longirostris, Cab. M. H. p. 96.
Cœreba cærulea, Léot. p. 120; Taylor, *l. c.* p. 81.

Five males and two females; the latter very well described by Dr. Léotaud.

Long. al.		caud.	rostr.	tars.	
2″ 1‴–2″	3‴	11–12‴	9–10‴	6½‴	(♂, Trinidad.)
2 1 –2	2	12	9–10½	7	(♀, Trinidad.)
2	2	12½	7½	6	(♂, New Granada, *cærulea*.)
2	2	12½	7½	6	(♂, Brazil, *cærulea*.)

The measurements noticed before seem to prove that the bill in this species is constantly longer, although otherwise there is no difference from the well-known *C. cærulea* from Brazil.

25. CŒREBA CYANEA (L.); Scl. Cat. p. 52; Léot. p. 118; Taylor, *l. c.* p. 81.

Two males, not different from Brazil ones.

Long. al.	caud.	rostr.	tars.
2″ 5‴–2″ 6‴	15–17‴	6–6½‴	6–6½‴

26. CERTHIOLA LUTEOLA, Licht.; Scl. Cat. p. 53; Taylor, *l. c.* p. 81.

Certhiola flaveola, Léot. p. 126.

Three specimens in old plumage.

Long. al.	caud.	rostr.	tars.
2″ 2½‴	15‴	6‴	7½‴

Being engaged in preparing a Monograph of the members of this difficult group, I keep back the many notes which I have already collected till I am able to give a full account, which I hope will be in a very short time.

Fam. Trochilidæ.

27. Phaëtornis mazeppa (Less.).

Glaucis mazeppa, Scl. Cat. p. 285; Taylor, *l. c.* p. 91.
Polytmus hirsutus, Léot. p. 139.
Glaucis hirsuta (part.), Cab. Mus. Hein. iii. p. 4.

Two specimens, differing from Brazilian ones only in having the tail-feathers tipped very narrowly with white; but, as Dr. Cabanis considers, this character is not constant, varying according to age and sex.

28. Lampornis gramineus (Gmel.); Scl. Cat. p. 291; Taylor, *l. c.* p. 91.

Polytmus dominicus, Léot. p. 132.

An old and a young male, corresponding very well with specimens from Guiana.

29. Lampornis mango (L.); Scl. Cat. p. 290; Taylor, *l. c.* p. 91.

Polytmus mango, Léot. p. 131.

Two females.

30. Heliomaster longirostris (Vieill.); Scl. Cat. p. 310; Taylor, *l. c.* p. 92.

Mellisuga longirostris, Léot. p. 147.

One specimen, agreeing with the description of the female by Dr. Léotaud.
The bill measures 1″ 3‴.

31. Chrysolampis moschitus (L.); Scl. Cat. p. 303; Taylor, *l. c.* p. 92.

Mellisuga moschita, Léot. p. 145.

One female and a young male, as described accurately by Dr. Léotaud.

32. Hemithylaca erythronota (Less.).

Saucerottia(?) *erythronota*, Scl. Cat. p. 315.
Polytmus erythronotus, Léot. p. 137.
Erythronota antiqua, Taylor, *l. c.* p. 92.

An old specimen.

Fam. Certhiadæ.

33. Xenops rutilans, Licht.; Scl. Cat. p. 159; Léot. p. 156; Taylor, *l. c.* p. 85.

Xenops heterurus, Cab. M. H. p. 33; Scl. Cat. p. 159.

One specimen, agreeing in respect to the markings of the tail with the description of *X. heterurus*, Cab., except that the fourth feather

is black only at the base of the outer web (not wholly), and that the fifth on the left side only is varied with black, whereas the fifth on the right hand is uniform rufous like the two innermost. In a specimen from Bogotá, received from J. Verreaux (s. n. *littoralis*, Scl.!), the outermost is quite rufous, the second black at the base of the inner web, the third black on the inner web (except a rufous apical spot), the fourth wholly black on the inner web, the fifth black on the outer web. A specimen from Brazil (Canto Gallo) has the two outer feathers wholly rufous, the third and fourth black on the inner web, the fifth rufous with black interrupted shaft-stripe.

It is easy to perceive that these differences in the colouring of the tail-feathers are of no specific value. The colouring of the underparts and the extent of the light shaft-spots is also variable, and will not allow of a specific separation. The Bogotá one has the underparts more greyish olive-brown with narrow whitish streaks, precisely the same as in a Brazilian specimen; the other Brazilian one has much broader shaft-streaks; in the Trinidad bird they are not so broad, but the colour of the underparts is more rufescent olive.

Long. al.	caud.	rostr.	tars.	
2″ 6‴	19‴	c. 5‴	6‴	(Trinidad.)
2 6	21	5½	6	(Bogotá.)
2 6	23	5	6½	(Brazil.)
2 4	21	c. 5	6	(Brazil.)

34. THRYOTHORUS RUTILUS, Vieill.; Scl. Cat. p. 21; Taylor, *l. c.* p. 81.

Troglodytes rutilus, Léot. p. 173.

Two specimens, somewhat smaller than a Brazilian specimen in the Bremen Collection.

Long. al.	rectr. med.	rostr.	tars.	
2″ 2‴	20‴	7‴	9‴	
2 3	20½	7	9	
2 5	22	7	10	(Brazil.)

35. HELEODYTES MINOR, Cab. M. H. p. 80; Scl. Cat. p. 16.

One specimen in apparently old plumage.

Upper surface of head dark brown; nape dark brown, with obsolete rufous-brown edgings; back and remainder of the upper parts uniform rufous brown; the upper tail-coverts with some indistinct dark-brown bars; from the nostrils above the eye to the sides of nape a broad white supercilium; lores white, with a narrow dark line; behind the eye a broad dark-brown streak to the nape; sides of head and neck and the whole underparts, including the under wing-coverts, white, tinged on the flanks and under tail-coverts with a pale isabelline colour; remiges dark olive-brown, paler on the margin of the inner web, the primaries on the outer web margined with reddish brown, the secondaries much broader, and with eight to ten obsolete dark bars; the tectrices of the primaries brown, those

of the secondaries rufous brown, with some indistinct dark bars; two middle tail-feathers dark brown with numerous (nineteen) blackish bars, remainder of the tail-feathers brownish black, with a broad (5‴) white cross band before the narrow dark end; bill black horn-colour, pale greyish at the base of the lower mandible; legs dark greyish brown, claws paler.

Long. al.	rectr. med.	rostr.	a rict.	tars.	dig. med.	
3″ 1‴	2″ 10‴	10½‴	13‴	12‴	8‴	(Trinidad.)
3 2	3 2	—	14	12	—	(ap. Cabanis.)
3″ 5‴–3 9	3″–3 3	—	—	13½–15	8–9½	(*griseus*, ap. Pelz.)

Dr. Cabanis has pointed out the characters of this apparently rare species, which is not mentioned in the work of Dr. Léotaud, in a very brief manner; a minute description therefore was necessary. Unfortunately I possess no specimen of *H. griseus*, Sw., which seems to be sufficiently distinct, not only in being considerably larger (as the measurements noticed by Von Pelzeln prove), but also in the coloration. Dr. Sclater notices, besides *H. griseus*, also a *H. minor* from Trinidad; but this latter "being so similar to *H. griseus* in every respect, except in size, I question whether it may not be a variety of age or sex of that species" (P. Z. S. 1856, p. 97). *H. minor*, as thus described, may be very probably only a smaller-sized specimen of the true *H. griseus*.

Fam. Lusciniadæ.

Mniotiltinæ.

36. Sylvicola æstiva (Gmel.).

Dendræca æstiva, Scl. Cat. p. 32; Taylor, *l. c.* p. 81.
Mniotilta petechia, Léot. p. 176.

Six males and two females, not distinguishable from specimens from the United States. One old male shows very narrow reddish-brown stripes on the vertex.

Long. al.	caud.	rostr.	tars.	
2″ 4‴–2″ 5½‴	18½–20‴	4–4½‴	8‴	(♂, Trinidad.)
2 3	18	4	8	(♀, Trinidad.)
2 4	18½	4	8	(♂, N. America.)
2 5	—	c. 5	9	(♂, *aureola*, Galapagos.)
2 5½	22½	5	9	(♀, *aureola*, Galapagos.)
2 5	22	5	9	(♀, *aureola*, Galapagos.)

The male has the head above bright yellow. Dr. Léotaud describes the Trinidad bird as having the head above "jaune orangé tirant sur le rouge." Might not this be *S. petechia*, L., which Dr. Sclater (Cat. p. 32) considers to be different from *S. æstiva*? But, as Dr. Léotaud states, *S. æstiva* arrives only as a winter visitor in the island of Trinidad.

Sylvicola aureola, Gould (Voy. Beagle, p. 86, pl. 28), from the

Galapagos, is closely allied to *S. æstiva*, but differs in its larger size. The male has the head above cinnamomeous orange, the chestnut blotches on the underparts are very pale and inconspicuous, and the back shows no traces of reddish brown. The female is quite different from that of *S. æstiva*.

37. TRICHAS ÆQUINOCTIALIS (Gmel.).

Geothlypis æquinoctialis, Scl. Cat. p. 27; Taylor, *l. c.* p. 81.
Trichas velatus, Léot. p. 183.

Two males and a female, agreeing with the characters pointed out by Dr. Cabanis (Mus. Hein. i. p. 16, note).

Long. al.	caud.	rostr.	tars.
2″ 1‴	1″ 10‴	5–5½‴	9–10‴

Dr. Sclater has rectified already (Ibis, 1867, p. 107) the error of Dr. Léotaud in taking this species for *Trichas velatus*, Vieill.

38. BASILEUTERUS VERMIVORUS (Vieill.); Scl. Cat. p. 34.

Trichas bivittatus, Léot. (nec Lafr.) p. 184.

One specimen, agreeing in every respect with a Brazilian specimen. This is a very widely distributed species.

39. SETOPHAGA RUTICILLA (L.); Scl. Cat. p. 36; Léot. p. 248; Taylor, *l. c.* p. 81.

Two males and a female, agreeing with specimens from the United States. One old male has the beak black, the other (also a very old one) only horn-brown, still paler than in the female.

VIREONINÆ.

40. HYLOPHILUS INSULARIS, Scl. P. Z. S. 1861, p. 128, Cat. p. 45; Léot. p. 186.

One specimen, agreeing very well with the description given by Dr. Sclater from a specimen from Tobago.

41. VIREO OLIVACEUS (L.).

Phyllomanes olivaceus et *P. chivi*, Cab. M. H. p. 63.
Vireosylvia olivacea et *V. agilis*, Scl. Cat. p. 43.
Vireosylvia olivacea, Léot. p. 250.

Long. al.	caud.	rostr.	tars.	
2″ 8‴	1″ 10‴	c. 6‴	8‴	(Trinidad.)
2 10	1 10	5½	7½	(Trinidad.)
3 0	1 11	6	8	(Peru.)
2 7	1 10	5½	8	(N. America.)
2 7	1 11	5½	7½	(N. America.)
2 8	1 10	5	8	(S. Brazil.)

Two specimens.

A careful comparison of specimens from Trinidad, the United

States, Peru (Chamicuros), and South Brazil (St. Catharina), convinces me that I am right in uniting *Vireo agilis* with *V. olivaceus*; for I am not able to find out a single constant character to distinguish them. Von Pelzeln already remarked (Orn. Bras. ii. p. 73, note 1) the only difference might be that *V. olivaceus* has the first primary equal to the fourth, whilst in *V. agilis* the first is equal to the fifth; but in my experience these differences are not constant and cannot be considered of specific value. In one North-American specimen the first quill is equal to the sixth, in the other to the fifth, as in a Trinidad one; in the other specimen from Trinidad the first quill is shorter than the fifth, in a Brazilian one a little longer, and in a Peruvian specimen of an intermediate length between the fourth and fifth. All the specimens have full-grown quills. With respect to the coloration, there is not difference sufficient to distinguish more than one species. The Trinidad skins agree in every respect with those from North America, as well as with the Brazilian specimen; the latter, collected by Mr. Burmeister, jun., is in general somewhat darker; the Peruvian one is duller above, the under tail-coverts are much paler, showing only a faint tinge of yellow; but, as we learn from Mr. Cassin (B. N. Am. p. 332), this is only an individual difference, for in North-American specimens the under tail-coverts "are sometimes almost entirely white." The size varies much.

As noticed by Professor Reinhardt, this little bird has been procured once in Greenland. Greenland and the southern portion of Brazil inhabited by one and the same species is a striking instance of the very extended distribution of many birds, at which I should feel much astonished if I had not met with numerous examples of the same kind in African ornithology.

Fam. Formicariidæ.

Thamnophilinæ.

42. Cyclorhis flavipectus, Scl. P. Z. S. 1858, p. 448, Cat. p. 45; Léot. p. 263; Taylor, *l. c.* p. 81.

? *Cyclorhis subflavescens*, Cab. J. f. Orn. 1860, p. 405.

Three specimens.

This species is closely allied to *C. wiedi*, Pelz. (Orn. Bras. iii. p. 137; *T. guianensis*, Neuw.; *C. viridis*, Burm., nec Cab.), from Brazil; but the head above is more decidedly grey, the rufous frontal and superciliary stripe broader and darker, and the legs are not lead-coloured, but light fleshy yellowish, this latter being the chief character.

Two old specimens have the head grey, only at the occiput washed with a dull brown; a third one has the whole upper surface of the head tinged with reddish olive, and the white on the abdomen also washed with a very faint tint of isabelline colour. This one, being in moult, is undoubtedly a young bird, and agrees very well with

the description of *C. subflavescens*, which seems not to be specifically separable.

Of *C. wiedii* I have lately received specimens from Ceará, in Northern Brazil.

Long. al.	caud.	rostr.	tars.	
2″ 8‴	2″ 0‴	7½‴	10‴	
2 9	1 11	7½	10	
2 8	2 1	7	10	(*wiedi*, Brazil.)

43. THAMNOPHILUS MAJOR, Vieill.; Scl. P. Z. S. 1858, p. 209; *ej.* Cat. p. 172; Taylor, *l. c.* p. 85.

Thamnophilus stagurus, Léot. p. 266.
Thamnophilus borbæ, Pelz. Orn. Bras. ii. p. 140.

An old bird.

This and two specimens from Guiana agree rather with the characters noticed to be differential by Von Pelzeln in *T. borbæ* than with the true *T. major*, Vieill., of Paraguay. But having before me a series of specimens from Brazil and Paraguay, I am not able to distinguish the two species exactly. It is true that specimens from the northern parts (Guiana) have apparently less white bars on the tail, which is shorter, but these characters are variable and not constant.

The Paraguay one has the two outer tail-feathers, except the white apical margin, with five broad white marginal patches, which on the outermost runs on both webs, nearly forming cross bands; the primaries have a well-defined white margin on the outer web; on the upper wing-coverts are two white cross bands, besides a third formed by the white outer margins of the tectrices of the secondaries. The Brazilian bird is alike with respect to the markings of the tail-feathers; but the white margins on the primaries are much less defined, and nearly all the tectrices are tipped with white (as in Spix's figure, t. 32. f. 1). It is the same in an old Guiana specimen (Demerara); but this one wants the white margins on the primaries almost entirely, and the white markings on the tail-feathers are narrower and on the outermost feather do not run on both webs. The Trinidad bird agrees with the latter; but it has the two white cross bands on the tectrices and the white margins on the primaries as strongly marked as the Paraguay one. In a somewhat younger specimen from Guiana the white tips on the tectrices are almost entirely absent, as well as the white margins on the primaries, and the two outer tail-feathers have seven white spots on the inner web. Two specimens from Ceará, in North Brazil, just received, agree with the Paraguay one, but the white on the tail-feathers is more defined and extended, forming on the two outermost regular bars as broad as the black between, the fourth and fifth have six white marginal spots, and the two innermost, instead of being uniform as in the Paraguay and Guiana birds, have five narrow white marginal spots on both webs, besides a white apical spot.

The measurements appended herewith will show that the size is also variable.

Long. al.	caud.	rostr.	tars.	
3″ 6‴	2″ 11‴	10½‴	15½‴	(♂, Trinidad.)
3 8	2 10	11½	15	(♂, Guiana.)
3 5	3 0	10½	14	(♂, Guiana.)
3 9	3 0	11	15	(♂, Brazil.)
3 7	3 3	10	15½	(♂, Paraguay.)
3 7	2 10	10	15	(♂, Brazil, Ceará.)
3 5	3 0	10	14	(♂, Brazil, Ceará.)
3 3	2 11	10	15	(♀, Brazil, Ceará.)

44. THAMNOPHILUS DOLIATUS (L.); Scl. Mon. P. Z. S. 1858, p. 217, Cat. p. 175; Léot. p. 264; Taylor, *l. c.* p. 85.

Male and female; somewhat smaller than Guiana specimens, but otherwise not different. Dr. Sclater measures the wing 3 inches (English).

Long. al.	caud.	rostr.	tars.	
2″ 8‴	1″ 11‴	7½‴	11½‴	(♂, Trinidad.)
2 6	1 10	—	11	(♀, Trinidad.)
2 9	2 3	8	11½	(♂, Guiana.)

45. THAMNOPHILUS ATRICAPILLUS (Gmel.); Scl. Mon. P. Z. S. 1858, p. 215; Cat. p. 174; Taylor, *l. c.* p. 85.

One specimen, similar to Guiana and Brazilian specimens, but the back distinct rufous brown without darker dots along the shafts. In this respect it resembles more *T. leucauchen*, Scl. (P. Z. S. 1855, pl. LXXIX.), which seems to be closely allied.

This species has been overlooked by Dr. Léotaud, but is noticed from Trinidad by Mr. Taylor.

FORMICARIINÆ.

46. FORMICARIUS HOFFMANNI (Cab.).

Myrmornis hoffmanni, Cab. Journ. f. Orn. 1861, p. 95.
Formicarius crissalis, Scl. Cat. p. 191.
Formicarius hoffmanni, Léot. p. 187.
?*Formicivora intermedia*, Taylor, *l. c.* p. 85.
?*Myrmoronis crissalis*, Cab. J. f. Orn. 1861, p. 96.
Formicarius hoffmanni et *F. crissalis*, Salvin, P. Z. S. 1866, p. 75.

Two specimens, which prove that *M. crissalis* is scarcely specifically different from *M. hoffmanni*. One specimen has the under tail-coverts dark chestnut, the other mixed with bright rufous feathers. Dr. Léotaud gives an excellent description of this species.

Long. al.	caud.	rostr.	tars.	dig. med.
3″ 7‴	1″ 10‴	8½‴	14‴	9‴
3 6	1 9	9	15	8½

It must be remarked that the allied *F. analis*, D'Orb., is by no

means confined to Bolivia. Natterer obtained specimens at Borba on the Rio Madeira; and Mr. Salvin got specimens from Costa Rica and Panama.

FLUVICOLINÆ.

47. FLUVICOLA PICA (Bodd.); Scl. Cat. p. 200; Léot. p. 205; Taylor, *l. c.* p. 85.

One specimen, not different from Brazilian ones.

Fam. TYRANNIDÆ.

48. MYIOZETETES INORNATUS, Lawr.; Ann. Lyc. New York, ix. (1869) p. 268.

One specimen, apparently an old bird, agreeing with the description of Mr. Lawrence.

This seems to be a very good species, characterized by having the whole upper part of head dark brownish black, without a bright vertical spot; a broad white band covers the forehead and runs above the eye and temples round the occiput; the feathers on the occiput are somewhat lengthened, more than usually in this genus.

Long. al.	rectr. med.	rostr.	lat. rostr.	tars.	dig. med.
3″ 7‴	3″	5½‴	3¾‴	10‴	5½‴

This species is not mentioned by Dr. Léotaud. Mr. Lawrence describes the bird from Valencia in Venezuela.

There seems to be still some confusion existing about the members of this difficult group. The short diagnoses given by Dr. Cabanis in the 'Museum Heineanum' are by no means sufficient to distinguish the species. The following notes, therefore, will be of some interest, giving revisional notices of some species.

Myiozetetes similis, Spix (*Elainea miles*, Burm., nec Neuw.; *M. similis*, Scl. Cat. p. 219). The Bremen Collection possesses two specimens from Brazil, agreeing very well with the description and figure given by Spix. The back is dirty olive-green, the vertex bright red; the remiges and rectrices are edged externally with dull olive-green; the remiges are bordered broadly on the basal portion of the inner web with pale yellowish. *Elainea cayennensis*, described in the 'Fauna Peruana' (p. 158), is apparently this species.

Myiozetetes texensis, Giraud. Like the preceding, but the back darker and more decidedly green, the coronal patch darker red, and the dimensions rather large. I do not believe that *M. columbianus*, Cab., is really separable (*vide* Journ. f. Orn. 1861, p. 245). This species is widely distributed from Mexico and Central America to Bogotá, Ecuador, and Venezuela. For its occurrence in Texas further evidence seems to be necessary; Mr. Baird has not included this species in his 'Birds of the United States.'

Myiozetetes cayennensis, L. (Scl. p. 219). This species, although nearly allied to the two foregoing, is very well characterized by having the remiges on the inner web very broadly margined with rufous; the quills and tail-feathers are also externally margined with rufous.

Brisson (Orn. ii. p. 404) in his excellent description mentions this peculiarity. Dr. Cabanis (Mus. Hein. p. 61) characterizes *M. cayennensis* as "pileo pulchre flavo;" but a specimen in our collection from Brazil has the vertical patch fiery-red as in *M. similis*, another one, from New Granada (Baranquilla), somewhat less bright, and a third specimen, from Guiana (Demerara), shows only a yellow patch, this latter being apparently a younger bird. Two specimens from Ceará, in North Brazil, agree; in one the coronal patch is dark red as in *M. texensis*, in the other much less vivid; both are males. I believe that *M. guianensis*, Cab., is not specifically different from *M. cayennensis*.

M. icterophrys, Heine (Journ. f. Orn. 1861, p. 197), notwithstanding Dr. Cabanis's suggestion that it is nothing else than *M. columbianus* in fresh-moulted plumage, I take to be a good species, distinguished by the yellowish tinge on the superciliary stripe and on the chin and throat; otherwise it resembles *M. texensis*, having also a bright fiery-red patch on the head, and yellowish margins on the inner web of the wings; but it is considerably smaller. We possess on old one from Baranquilla, and a young one from Bogotá; the latter, being in moult, has no vertical spot, and the yellow on the belly is brighter yellow. *M. granadensis*, Lawr. (Ibis, 1862, p. 11), is identical with this species.

I must, however, remark that *Muscicapa trivirgata*, Neuw., can scarcely be the female of *M. similis*, because the Prince, a very accurate describer, as is well known, says "chin and throat yellow," and his measurements are much smaller.

Long. al.		caud.		rostr.	latit. ad bas.	tars.	dig. med.	
3″	7‴	2″	8‴	5¾‴	3¼‴	8‴	5½‴	(♂, *similis*, Brazil.)
3	5	2	7	5¼	3	8½	5½	(♀, *similis*, Brazil.)
3	9	2	11	5½	3	8½	6	(♂, *texensis*, Mexico.)
3	4	2	7	5	3¼	8½	5½	(♂, *cayennensis*, Brazil.)
3	3	2	6	5	2¾	8	5	(♂, *cayennensis*, Bogotá.)
3	3	2	6	5	3½	8	—	(♂, *cayennensis*, Brazil, Ceará.)
3	0	2	3	5¼	3	8	5	(♂, *cayennensis*, Demerara.)
3	2	2	4	5½	3	8	5	(♂, *icterophrys*, Bogotá.)
2	10	2	1	5½	3½	7½	5	(♂, *icterophrys*, New Granada.)

49. Saurophagus sulphuratus (L.).

Pitangus sulphuratus, Scl. Cat. p. 222.
Saurophagus sulphuratus, Léot. *l. c.* p. 210.

Two specimens.

There is a great variation in the extent of the cinnamon-red colour on the inner web of the quills and tail. In one specimen the rufous colour borders only the inner web, is broad on the quills, narrow on the tail-feathers; in the other one the rufous colour is much brighter and much more extended, nearly as much as in *S. rufipennis*, Lafr., a species which Dr. Sclater also notices from Tri-

nidad (Cat. p. 222). But in our Venezuelan specimens of *S. rufipennis* the whole of the inner web of the secondaries is rufous, whereas in this Trinidad one the secondaries are still brown on the apical third of the feather. The rufous on the inner web of the tail-feathers is also more extended in *S. rufipennis*.

The nearly allied *S. maximiliani*, Cab. (*pitangua*, Neuw.), from Brazil agrees in size and colours, except in having a broad white frontal band; whereas in *S. sulphuratus* there exists only a narrow frontal line, the feathers of which are white with brownish shafts, the forehead therefore becoming washed strongly with white.

S. maximiliani I got in a collection of birds from Ceará, in North Brazil, collected by Mr. Amandus Zietz of Hamburg.

The southern *S. bellicosus* is easily distinguished by the much larger size. *S. sulphuratus* of Burmeister (ii. p. 461) belongs to this latter species, and not to *S. maximiliani*.

Long. al.		caud.		rostr.	lat. rostr.	tars.	dig. med.	
4″	2‴	3″	1‴	9¾‴	5‴	11‴	8‴	(*sulphuratus*, Trinidad.)
4	4½	3	3	11	5	10½	—	(*sulphuratus*, Trinidad.)
4	0	3	0	10	4½	10½	7½	(*sulphuratus*, Guiana.)
4	3	3	0	10	4¾	11	7	(*maximiliani*, Brazil.)
4	4	2	11	11	5	11	7	(*maximiliani*, Brazil.)
5	1	3	7	12	5	14	8	(*bellicosus*, Paraguay.)

50. MEGARHYNCHUS PITANGUUS (L.); Cab. M. H. ii. p. 64.

Megarhynchus pitanguus, mexicanus et *chrysogaster*, Scl. Cat. p. 224.

Megarhynchus chrysogaster, Léot. p. 208.

Megarhynchus pitangua, Taylor, *l. c.* p. 86.

Megarhynchus chrysocephalus, Cab. M. H. p. 65.

Two specimens, agreeing in size and colours with others from Costa Rica, Guiana, and Brazil.

"The climatic variety or species" from Ecuador, which Dr. Sclater separated as *M. chrysogaster* (P. Z. S. 1860, p. 281), does not merit a specific denomination. Our Guiana specimen shows the underparts darker yellow than that from Trinidad and Brazil. *M. mexicanus*, Lafr., said to be larger, is also by no means a distinguishable species. Our Brazilian one is as large as that from Costa Rica. Dr. Sclater himself mentions that Panama specimens (P. Z. S. 1864, p. 360) are "intermediate between *M. mexicanus* and *M. chrysogaster* of Ecuador, showing that these two forms pass into one another."

Megarhynchus chrysocephalus (Tsch.), Heine (Journ. f. Orn. 1859, p. 345; Mus. Hein. ii. p. 65), from Venezuela, is, as Dr. Sclater already noticed, most probably this species, the true *M. chrysocephalus* of Tschudi being totally different.

Whether *M. ruficeps*, Sw., indeed belongs to *M. pitanguus*, as usually adopted, seems to be still somewhat dubious. We possess a specimen having a large bright cinnamon-red patch on the vertex, without any inclination to yellow or orange.

Long. al.	caud.	rostr.	lat. ad bas.	tars.	dig. med.	
4″ 3‴	2″ 11‴	13‴	7‴	9½‴	7‴	(Trinidad.)
4 0	2 9	13	6½	9	—	(Trinidad.)
4 3	3 0	12½	7	9	6½	(Demerara.)
4 5½	3 2	13	7	9	7	(Costa Rica.)
4 5	3 1	11½	7	9	—	(Brazil.)
4 2	3 0	14	7	9	6½	(Brazil.)
4 6	3 2	14	7½	9	—	(Brazil, Ceará.)

51. TYRANNUS MELANCHOLICUS, Vieill.

Laphyctes melancholicus et *L. satrapa*, Cab. M. H. ii. pp. 76, 77.
Tyrannus melancholicus et *T. satrapa*, Scl. Cat. p. 235.
Tyrannus melancholicus, Taylor, *l. c.* p. 87.
Tyrannus verticalis, Léot. (nec Say) p. 213.

A younger specimen, without red patch on the crown; the first primaries not attenuated at the apex.

There is no difference whatever between specimens from Venezuela (Angostura) and the Argentine republic (Mendoza); the separation into two representative species for the north and south has therefore no real value. In contradiction to the views of Dr. Cabanis, I agree with Von Pelzeln in considering *T. albigularis*, Burm. (Bras. ii. p. 465), to be specifically different from *T. melancholicus*. A specimen from Brazil in the Bremen Museum shows the chin and throat decidedly white; whereas these parts in *T. melancholicus* are whitish grey. Four specimens from Northern Brazil (Ceará) all show this latter character.

Long. al.	rectr. ext.	rect. med.	rostr.	lat. rostr. ad bas.	tars.	
4″ 1‴	3″ 5‴	2″ 9‴	8½‴	5‴	8‴	(*melancholicus*, Trinidad.)
4 3	3 5	2 9	9	5	8	(*melancholicus*, Venezuela.)
4 5	3 5	2 9	9	5	8	(*melancholicus*, Mendoza.)
4 3	3 4	3 0	9	5½	—	(♂, *albigularis*, Brazil, Ceará.)
3 9	3 2	—	9½	5	—	(♀, *albigularis*, Brazil, Ceará.)
4 2	3 5	2 11	8½	4½	8	(*albigularis*, Brazil.)

52. MILVULUS TYRANNUS (L.); Léot. p. 217.

Milvulus tyrannus et *violentus*, Scl. Cat. p. 237.

One specimen not quite in full plumage, and the yellow feathers on the crown just developing.

The northern and southern forms of this species do not merit a specific separation; at least I cannot find any character which proves to be constant. According to Dr. Cabanis, the Brazilian *M. violentus* may be distinguished in having a darker-coloured back; but in one specimen from Rio Grande do Sul, on the contrary, I find the back lighter, whereas in another specimen from the same locality the back is as dark as in a specimen from Trinidad, which agrees in every respect with two others from Bolivia. A younger specimen from Demerara has the upper parts washed with brown.

Milvulus monachus, Hartl., is based upon a young specimen, as described by Von Pelzeln (Orn. Bras. ii. p. 118, Anmerk. 2). This

last-named ornithologist, having before him twenty-four specimens from Natterer's collection, agrees with me in accepting only one species.

The occurrence of this bird in the United States (New Jersey), as stated by Audubon, has not yet been confirmed.

The size is variable in a high degree.

Long. al.	rectr. ext.	rostr.	tars.	dig. med.	
4″ 1‴	—	6½‴	8‴	6‴	(jun. Trinidad.)
3 10	5″ 3‴	6	7	5	(jun. Guiana.)
3 6	4 2	5	7½	5	(jun. Guatemala, type of *M. monachus*.)
4 3	8 5	6	8	5	(♂ ad., Rio Grande do Sul.)
3 11	8 0	6	8	5	(♂ ad., Rio Grande do Sul.)
4″ 1‴–4 3	9″–9 3	6½	8	5–5½	(♂ ad., Bolivia.)

Fam. COTINGIDÆ.

TITYRINÆ.

53. PACHYRHAMPHUS NIGER, Spix; Scl. Cat. p. 241; Taylor, *l. c.* p. 87.

Tityra nigra, Léot. p. 241.

Two males in adult plumage, and one female.

One male black below, only the under tail-coverts being speckled with grey; the other has the whole underparts speckled very minutely with grey on a fuliginous ground. The female agrees very well with the excellent description given by Dr. Léotaud, but shows a singular peculiarity in having the six tail-feathers on the left side with white apical spots, those on the right side with much broader ochreous ones.

The female described by Dr. Sclater (P. Z. S. 1857, p. 76), "rufa, subtus valde dilutior, ochracescens," does not belong to this species.

PIPRINÆ.

54. PIPRA AURICAPILLA, Briss.; Scl. Cat. p. 249; Taylor, *l. c.* p. 87.

Pipra erythrocephala (L.); Léot. p. 255.

Twelve old specimens, not different from Cayenne and Demerara specimens.

Long. al.	caud.	rostr.	tars.
2″ 1‴–2″ 2½‴	8½–9‴	3¼–3½‴	6½‴

55. CHIROMACHÆRIS MANACUS (L.); Scl. Cat. p. 252; Taylor, *l. c.* p. 87.

Pipra gutturalis, Léot. p. 252.

Two males and a female. There is no difference in specimens from Guiana and Brazil.

Von Pelzeln (Orn. Bras. ii. p. 130) has pointed out very accurately the distinguishing characters between this species and the nearly

allied *C. gutturosa*, Desm. The latter we possess from Brazil and New Granada.

The females of the two species are closely allied; but the female of *C. manacus* may be distinguished by being paler olive-green beneath, the underpart of the breast and vent especially are pale yellowish white.

56. CHIROXIPHIA LANCEOLATA (Wagl.); Scl. Cat. p. 251.

Chiroxiphia melanocephala (Vieill.?); Bp. Consp. i. p. 172.
Pipra pareola, Hahn, Vög. aus Asien, Afr. &c. Liefer. xvi. f. 4 (opt.).

An old male and a young male. The latter is dull olive-green; wings and tail dull olive-brown, with greenish edgings externally; the head capped bright scarlet as in the old male; the two middle tail-feathers already prolonged and lanceolated as in the old male, but green.

Specimens from New Granada (Baranquilla) are in every respect like.

"Le Manakin à longue queue de l'île de la Trinité" (*Pipra melanocephala*, Vieillot, Enc. M. p. 389) has nothing whatever to do with this species, and remains doubtful. Dr. Léotaud has omitted this species.

COTINGINÆ.

57. CHASMORHYNCHUS VARIEGATUS (Gmel.); Scl. Cat. p. 257.

Procnias variegatus, Léot. p. 259.

One specimen in change of plumage; upper and under parts like the female (green); rump and upper tail-coverts white; surface of head brown like the male; some of the remiges already deep black.

Long. al.	caud.	rostr.	rict.	lat. ad bas.	tars.	
5″ 10‴	3″ 3‴	8‴	16‴	6½‴	12½‴	
6 0	3 1	8	14	6	13	(♂ ad., Venezuela.)

58. CHASMORHYNCHUS NIVEUS (Bodd.); Scl. Cat. p. 258, Ibis, 1867, p. 108; Taylor, *l. c.* p. 88.

Procnias nivea, Léot. p. 261.

One young bird in obscure green plumage, without a frontal horn, agreeing with a specimen from Guiana (Demerara) in the Bremen Museum.

Long. al.	caud.	rostr.	rict.	lat. ad bas.	tars.	
5″ 1‴	2″ 11‴	8‴	13‴	5‴	12‴	(Trinidad.)
5 5	3 0	7½	14	5½	12	(Guiana.)

The occurrence of this species in the Island of Trinidad, as stated by Dr. Léotaud, has been doubted by Dr. Sclater, who believed that Dr. Léotaud might have been wrong in his determination. As the specimen belonging to this collection proves, there cannot remain any doubt that Dr. Léotaud was right in identifying the species.

Fam. Icteridæ.

Agelainæ.

59. Sturnella hippocrepis, Wagl.

Sturnella hippocrepis, mexicana et *meridionalis*, Scl. Ibis, 1861, p. 179; Cat. Am. B. pp. 139, 841, 842, 843.
Sturnella hippocrepis, Gundl. J. f. Orn. 1856, p. 14.

Long. al.	caud.	rostr.	tars.	dig. med.	
3″ 9½‴	2″ 4‴	13½‴	17‴	11‴	(*hippocrepis*, Trinidad.)
3 11	2 6	14	18	11½	(*hippocrepis*, Venezuela.)
4 9	2 6	12½	17	10½	(♂, *magna*, California.)
4 3	2 3	13	16	10	(♂, *magna*, California.)
4 7	3 0	14	18	12½	(N. America.)

One specimen, similar in every respect to one from Venezuela (Angostura) in the Bremen Collection. Not included in Dr. Léotaud's work.

Whether *S. hippocrepis* is really a species or not I am unable to answer with full certainty. The above-mentioned specimen differs from North-American ones in having the sides, the under and upper tail-coverts, as well as the ground-colour of the back more decidedly chestnut reddish; the neck-gorget is narrower, and the wings are shorter. But these differences seem to be only in consequence of age, and referable to the bird being younger. The primaries in both specimens are just developing, and thus the wing is shorter.

The separation of the *Sturnellæ* into five localized species, as Dr. Sclater endeavoured to set forth (Ibis, 1861, p. 179), in which he was followed by Mr. Cassin (Proc. Ac. Phil. 1866, pp. 23, 24), seems to be inadmissible; nobody can distinguish the so-called species from the short diagnoses given as above cited. Mr. Baird has pointed out very minutely the distinctive characters between the eastern and western *S. magna* and *neglecta* (B. N. Am. p. 536); but having before me both forms, I am unable to find any constancy of the characters said to be of specific value. A chief character for *S. neglecta*, having the yellow of chin and throat extending on the side of the lower jaw (not confined strictly within the rami of the lower jaw as in *S. magna*), is not constant. One specimen from California shows this peculiarity; another from the same locality does not do so.

Dr. Cabanis (J. f. Orn. 1856, p. 14, et 1861, p. 10), after having examined specimens from North America, Cuba, Costa Rica, Venezuela, and Guiana, comes to the conclusion that there is only one species; and I believe this opinion is quite right.

60. Pseudoleistes melanicterus, Vieill.

Gymnomystax melanicterus, Scl. Cat. p. 137.
Leistes melanicterus, Cass. Proc. Ac. Phil. 1866, p. 14.

One specimen in the old plumage, agreeing with Brazilian specimens.

This species seems not to have been before recorded from Trinidad.

61. LEISTES GUIANENSIS (L.); Scl. Cat. p. 138; Taylor, *l. c.* p. 84.

Leistes americanus, Léot. p. 279.

Two specimens, not different from others from Guiana.

62. LEISTES ICTEROCEPHALUS (L.).

Chrysomus icterocephalus, Léot. p. 281.
Xanthosomus icterocephalus, Scl. Cat. p. 136; Taylor, *l. c.* p. 84.
Leistes icterocephalus, Cass. Proc. Phil. 1866, p. 14.

An old bird, similar to specimens from New Granada.

63. MOLOTHRUS ATRONITENS, Cab. in Schomb. Guian. iii. p. 682.

Molothrus bonariensis, Léot. (nec Gmel.) p. 277.
Molothrus sericeus (part.), Scl. Cat. p. 135.
Molothrus atronitens, Pelz. Orn. Bras. iii. p. 200.

Two specimens.

Old; black, the entire upper and under parts of head and body having a dark purplish-violet lustre, except the middle of the vent and under tail-coverts, which show a dark metallic-green lustre, like the wings and tail and the coverts of the primaries and secondaries; bill and feet black.

A specimen in the Bremen Collection from Brazil agrees in every respect.

Long.	al.	(rect. med.) caud.		rostr.	altit. ad bas.	tars.	
3″	9‴	2″	7‴	7½‴	3¾‴	11‴	(ad., *atronitens*, Cab., Trinidad.)
3	8	2	6½	8	4	10½	(ad., *atronitens*, Cab., Trinidad.)
3	7	2	6	7	3¼	10½	(ad., *atronitens*, Cab., Brazil.)
3	9	2	8	—	—	11	(ap. Cabanis.)
4	3	2	11	7½	4	12½	(*bonariensis*, Gmel., Brazil.)
4	11	3	10	8½	4½	13	(♂, *cassini*, New Granada.)
4	10	3	8	8½	4¼	13	(♂, *cassini*, New Granada.)
4	6	3	2	8½	4½	13	(♂, *cassini*, New Granada.)
4	4	3	1	8½	4½	13	(♂, *æneus*, Wagl., New Granada.)

The description given by Dr. Cabanis, "like *bonariensis*, but much smaller," and the measurements given by him, are undoubtedly referable to this species. The purple-violet lustre on the head and body is quite the same as in *M. bonariensis*; but this latter species does not show the metallic-green shade on the wings and tail so bright, and wants the green lustre on the vent and under tail-coverts. It may possibly be that Vieillot's *Passerina discolor* is this species; but the description not being accompanied by measurements, it is impossible to refer it with certainty to any of the known species of this extremely difficult group. Mr. Cassin, therefore, is certainly wrong in characterizing *M. discolor* (=*atronitens*) as "rather larger than *M. bonariensis* (al. 4¼–4½″)," the true *M. atronitens* being, on the contrary, much smaller. The bird which Mr. Cassin (Proc. Ac. Phil. 1866, p. 20) describes as *M. discolor*, from Trinidad and Cuba, we possess in the Bremen collection from New

Granada (Baranquilla), s. n. *M. robustus*, Cab. The colouring is exactly the same as in *M. atronitens*, also the metallic-green lustre on the vent and under tail-coverts; but the size is constantly much larger. Having proved that *M. discolor* of Cassin cannot be either *M. discolor* of Vieillot or *M. atronitens* of Cabanis (a fact which has been already mentioned by Von Pelzeln, Orn. Bras. iii. p. 200, note 3), I am justified in giving it a new name—*Molothrus cassini*, Finsch. The *Molothrus* sp.?, described by Dr. Sclater (Cat. pp. 135, 821, note), from Trinidad, belongs apparently to this species. I must mention that Dr. Gundlach does not notice this bird in his lists of the birds from Cuba. *M. æneus*, Wagl. (= *robustus*, Cab., Cass. Proc. Phil. 1866, p. 18), from Mexico and Central America, we possess also from New Granada. This species is easily distinguished from *M. cassini*, with which it nearly agrees in size; but those parts which are dark purple-violet in *M. cassini*, in *M. æneus* are black with a silky metallic bronze-like lustre, as described by Wagler and Cassin. *M. purpurascens*, Cassin (*l. c.* p. 20), from Peru, seems to be nearly allied; also his *M. sericeus* (*l. c.* p. 21) from Brazil, which is by no means the species described under this name by Lichtenstein and Swainson. *Xanthornus purpurascens*, Hahn (Vög. aus Asien, Africa, &c. Liefer. v. t. 4), is very probably not the species described under this appellation by Cassin, but must be referred to *M. bonariensis*, Gmel. (Cass. *l. c.* p. 19), with which *Icterus sericeus*, Licht. (Doubl. Cat. p. 19), and *Icterus violaceus*, Neuwied (Beitr. iii. p. 1212), are identical, and, as I am strongly of opinion, also the *Passerina discolor* of Vieillot.

Chalcophaninæ.

64. Chalcophanes lugubris (Sw.).

Quiscalus lugubris, Sw. An. in Menag. p. 299, f. 54 (nec 50) c; Scl. Cat. p. 141; Taylor, *l. c.* p. 84.
Chalcophanes jamaicensis et *minor*, Cab. Schomb. Reise, iii. p. 683.
Chalcophanes lugubris et *minor*, Cab. M. Hein. p. 197.
Quiscalus barita, Léot. p. 268.
Quiscalus lugubris, Cass. Proc. 1866, p. 408.

Old male; black, with a faint purple-violet lustre, much less decided than in *Molothrus bonariensis*; quills and tail with a slight green lustre; the under tail-coverts washed with metallic green; bill and feet black. Another specimen is more uniform glossy black, the purple-violet lustre being scarcely visible. A younger one (or female) shows no purple or greenish reflection; the underside is lighter, more dull brownish black; chin paler brown.

Specimens from Demerara in the Bremen Museum are like.

Long. al.	rectr. med.	rectr. ext.	rostr.	tars.	
4″ 5‴	3″ 9‴	2″ 10‴	11‴	13‴	(♂ ad., Trinidad.)
4 3	3 4	2 10	11	13	(♂ ad., Trinidad.)
3 11	3 2	2 5	10	12	(♂ jun., Trinidad.)
4 3	3 7	2 10	11	14	(♂ ad., Guiana.)
3 9	2 11	2 5	—	12½	(♂ jun., Guiana.)

Icterinæ.

65. Ostinops cristatus (Gmel.).

Ostinops cristatus, Scl. Cat. p. 127; Taylor, *l. c.* p. 83.
Cacicus cristatus, Léot. p. 271.

One specimen.

66. Cassicus icteronotus, Vieill.

Cassicus persicus (L.); Scl. Cat. p. 128; Taylor, *l. c.* p. 84.
Icterus persicus, Léot. p. 273.

Males and females, very much varying in size. Not different from specimens from Guiana.

Long. al.	rect. med.	rostr.	tars.	
6″ 0‴	3″ 10‴	15½‴	15‴	(♂, Trinidad.)
5 8	3 7	16	15	(♂, Trinidad.)
4 2	2 5	13	13	(♀, Trinidad.)
4 10	2 10	14	—	(♀, Trinidad.)
4 10	3 4	14½	13	(♀, Guiana.)

67. Icterus vulgaris, Daud.; Scl. Cat. p. 133.

Two specimens (old males), agreeing with specimens from Cayenne. One specimen has a white mark on the inner web of the exterior tail-feathers, but only on those of the right side.

Not included by Léotaud.

Long. al.	caud.	rostr.	tars.	
4″ 4‴	4″ 0‴	14‴	14‴	(Trinidad.)
4 6	3 11	13	15	(Trinidad.)
4 5	3 11	12½	14	(Cayenne.)

68. Icterus xanthornus (L.); Scl. Cat. p. 133; Léot. p. 275; Taylor, *l. c.* p. 84.

Two males, similar to specimens from Venezuela and Mexico.

Fam. Tanagridæ.

69. Euphona trinitatis, Scl. P. Z. S. 1856, p. 274; Cat. Am. B. p. 57.

Euphone chlorotica, Léot. p. 308.

Three males and two females.

This species differs from the near-allied *E. chlorotica* chiefly in having a narrow black frontal margin, as pointed out by Dr. Sclater. Three males show on the two outer tail-feathers a large white median patch; in another from Trinidad (Bremen collection) this white patch is much smaller.

The female is exactly described by Dr. Léotaud. It is above bright olive-green, tinged strongly with yellow; forehead, an indistinct superciliary stripe, and the upper tail-coverts are more decided yellow; chin, throat, and sides of the body yellow, brightest on the under tail-coverts; remainder of the under parts (throat, breast, and

belly) light pearl-grey, inclining to whitish on the belly; quills and tail brownish black, margined externally with olive yellowish green; under wing-coverts white.

Long. al.	caud.	rostr.	tars.	
2″ 1‴	13½‴	3⅛‴	6½‴	(♂, Trinidad.)
2 1	15½	3⅛	6	(♂, Trinidad.)
1 10½	12½	3	6	(♀, Trinidad.)
2 1	14	3	6	(♂, *chlorotica*.)

70. EUPHONA VIOLACEA (L.); Scl. Mon. P. Z. S. 1856, p. 277, Cat. p. 58; Taylor, *l. c.* p. 82; Léot. p. 306.

Phonasca lichtensteinii, Cab. J. f. Orn. 1860, p. 331, 1865, p. 410. *Euphone lichtensteinii*, Pelz. Orn. Bras. iii. p. 204.

Eighteen specimens, all males in full dress. The yellow on the forehead extends to the fore part of the eye; in one specimen it reaches a little further up. The extension of the white on the inner web of the two external tail-feathers varies somewhat; in most of the specimens the inner web is white, with a dark base, and a narrower or broader apical margin; only three specimens of the eighteen show on the inner web of the third tail-feather a white spot.

Long. al.	caud.	rostr.	tars.	
2″ 1‴–2″ 3½‴	12–14‴	c. 3½–4‴	6½–7‴	(ad., Trinidad.)
2 2	14½	3½	7	(ad., Guiana.)
2 3	14½	3¾	7	(ad., Brazil.)

There is no difference in specimens from Brazil and Demerara. *E. lichtensteinii*, said to be smaller, I am not able to distinguish from *E. violacea*, and consider the two, without hesitation, to be identical.

71. EUPHONA NIGRICOLLIS, Vieill.; Scl. Mon. P. Z. S. 1856, p. 272; Taylor, *l. c.* p. 81.

Euphona aureata, Léot. p. 310.

One specimen, an old male, not different from Brazilian specimens.

72. CALLISTE GUTTATA (Cab.); Scl. *l. c.* p. 64; Léot. *l. c.* p. 305; Taylor, *l. c.* p. 82.

One specimen, not distinguishable from others from Ecuador (Quito) in the Bremen Museum.

73. CALLISTE VIEILLOTI, Scl. *l. c.* p. 69; Taylor, *l. c.* p. 82; Léot. *l. c.* p. 303.

Three specimens.

Distinguished from *C. flaviventris*, Vieill., by the decided yellow coloration of the under parts; but apparently a well-marked species.

74. CALLISTE DESMARESTI, Gray; Scl. *l. c.* p. 68; Léot. *l. c.* p. 302; Taylor, *l. c.* p. 82.

Similar to specimens from Venezuela (Caracas).

75. THRAUPIS CANA (Sw.).

Tanagra cana, Scl. Mon. p. 232, Cat. Am. B. p. 75; Taylor, *l. c.* p. 82.

Tanagra glauca, Léot. (nec Sparrm.), p. 293.

Two specimens, not differing from one from Brazil in the Bremen collection.

Long. al.	caud.	rostr.	tars.	
3″ 5‴	2″ 3‴	6‴	9‴	(Trinidad.)
3 6	2 4	6	9	(Brazil.)
3 4	2 3	6	9½	(*glaucocolpa*, Venezuela.)
3 10	2 8	5½	10	(*cyanoptera*, Brazil.)

In the Catalogue of Dr. Sclater's collection (p. 75) there is noticed from Trinidad *Tanagra glaucocolpa*, Cab. (Mus. Hein. p. 28), which is not mentioned by Dr. Léotaud. We possess a specimen of *Thraupis glaucocolpa* from Venezuela (Baranquilla); Cabanis notices this species from Caraccas. Its nearest ally is *Th. cyanoptera*, Vieill., but it is much smaller; breast and sides of the belly bright ultramarine-blue, the coverts of the primaries (in Cabanis's description erroneously described as "alula spuria") dark greenish blue, forming a well-defined mark on the wing; under tail-coverts dirty white.

Th. cœlestis, Spix (Av. Bras. ii. t. 55. f. 2), is by no means the same as *Th. episcopus*, L., as Cabanis suggests, but is a well-marked species, easily distinguished by the broad white apices of the tectrices of the secondaries, forming a white band across the wing. Dr. Sclater has already corrected this in his valuable Monograph. *Th. serioptera*, Sw. (An. in Menag. p. 313; Cab. M. H. p. 28), from Demerara, is undoubtedly the same as *Th. episcopus*, L., as the accurate description of Brisson (*Episcopus avis*) shows. We possess this species also from Demerara.

76. THRAUPIS PALMARUM (Neuwied).

Thraupis olivascens, Licht.

Thraupis melanoptera, Hartl.

Thraupis palmarum et *melanoptera*, Scl. Mon. pp. 234, 235.

Thraupis melanoptera, Taylor, *l. c.* p. 82.

Thraupis olivascens, Léot. p. 295.

Three specimens.

Dr. Sclater and Von Pelzeln are of opinion that *T. melanoptera* may be only a local variety of *T. palmarum*, having inspected intermediate forms from Bolivia and Trinidad (Sclater). Having before me ten specimens from Brazil, Trinidad, Guiana, and Peru, I am not able to find out any constant difference, and must declare them all to be identical, although there exist some differences. The Brazilian bird has the remiges broadly edged externally with dull olive; in the Peruvian specimen (type of *T. melanoptera*) only a slight sign of these olive edgings is visible. These two birds seem to belong to two well-distinguished species. But there are other specimens from Demerara and Trinidad so intermediate in this respect that one cannot

say whether they belong best to *T. palmarum* or *T. melanoptera*. One specimen from Trinidad agrees throughout with the Peruvian one, the olive edgings being nearly altogether wanting; another from Demerara shows these edgings a very little defined; a Bahia specimen narrower than that from South Brazil. Young birds have the under parts uniform dull greyish olive-green, without the purplish-blue tint. In respect of size there is no reason for any separation.

Long. al.	caud.	rostr.	tars.	
3″ 11‴	2″ 9‴	5¼‴	c. 10‴	(Brazil.)
3 8	2 7	5½	9	(Bahia.)
3 9	2 7	6	9	(Trinidad.)
3 8	2 6	6	9½	(Trinidad.)
3 6	2 6	5½	9	(Trinidad.)
3 7	2 8	5½	9½	(Guiana.)
3 6	2 7	5	9	(Guiana.)
3 7	2 6	5¼	9½	(Peru.)

77. RAMPHOCELUS MAGNIROSTRIS, Lafr.; Scl. P. Z. S. 1856, p. 129, Cat. p. 79; Taylor, *l. c.* p. 82.

Ramphopis jacapa, Léot. p. 288.

Two specimens, old and young.

This species seems to differ from *R. jacapa*, L., in having the bill constantly stronger, especially the lower jaw is much broader and higher at the base; the coloration is quite the same in both species.

Long. al.	caud.	rostr. a front.	alt. mand.	tars.	
3″ 0‴	2″ 10‴	7‴	3‴	10‴	(*magnirostris*, Trinidad.)
3 2	2 0	6½	3	10	(*magnirostris*, Trinidad.)
3 1	2 10	6½	2¾	—	(*magnirostris*, Trinidad.)
3 0	2 8	6	2	9	(*jacapa*, Demerara.)
2 10	2 8	5½	2	9	(*jacapa*, Brazil.)

78. PHŒNICOTHRAUPIS RUBRA (Vieill.); Scl. Mon. P. Z. S. 1856, p. 120, Cat. p. 83; Taylor, *l. c.* p. 82.

Tachyphonus ruber, Léot. p. 297.

One specimen in old plumage, agreeing with a specimen (named *T. erythrolæma*, Bp.) from New Granada (Baranquilla) in the Bremen collection.

This species resembles very much *P. rubica* et *P. ignicapilla*, Licht. (*rubicoides* !!, Lafr.), but is somewhat smaller, while the tail especially is shorter; the under parts are brighter and more rose-coloured; besides it is easily distinguishable in having the inner web of the quills bordered with a clear rose, this bordering being in *P. rubica* dirty brownish red, in *P. ignicapilla* whitish.

Long. al.	caud.	rostr.	tars.	
3″ 6‴	2″ 8‴	6‴	10‴	(Trinidad.)
3 3½	2 8	6	10	(New Granada.)
3 7	3 3	6½	11	(*rubica*, Brazil.)
3 9	3 5	7	12	(*ignicapilla*, Guatemala.)

79. TACHYPHONUS MELALEUCUS (Sparrm.); Scl. Mon. Tanagr. P. Z. S. 1856, p. 113; Taylor, *l. c.* p. 82.

Tachyphonus beauperthuyi (Bp.); Léot. p. 299.

Male and female (dark fulvous, beneath lighter), agreeing in every respect with specimens from Brazil. There exists a considerable variability in size in this widely distributed species.

80. TACHYPHONUS LUCTUOSUS, Lafr.; Scl. Mon. p. 114.

Tachyphonus albispecularis, Léot. p. 300.

One specimen changing the plumage; black, upper and under quill-coverts white; some of the remiges and the rectrices dark brown, edged with dirty olive-green on the outer web.

The identity of *T. albispecularis* with *T. luctuosus* has been already pointed out by Dr. Sclater (Ibis, 1867, p. 108).

Fam. FRINGILLIDÆ.

81. CARDINALIS PHŒNICEUS, Gould; Scl. Cat. p. 100.

Two specimens, not differing from a specimen from Honduras in the Bremen collection.

Not included by Dr. Léotaud. Mr. Taylor doubts the occurrence of this species in Trinidad (Ibis, 1864, p. 83), which is now confirmed.

82. CYANOLOXIA CYANOIDES (Lafr.).

Guiraca cyanoides, Scl. Cat. p. 101.

Similar to specimens from Cayenne.

This species is also not mentioned in Dr. Léotaud's work on the birds of Trinidad.

83. VOLATINIA JACARINA (L.); Scl. Cat. p. 106; Taylor, Ibis, 1864, p. 83.

Tiaris jacarina, Léot. p. 312.

Spermophila splendens et *S. lugubris*, Hartl. Verz. 1844, p. 81.

Three specimens in old plumage.

There is no difference whatever between specimens from Mexico and Brazil, which are before me, as Dr. Cabanis has declared already (J. f. Orn. 1861, p. 2).

84. SPERMOPHILA MINUTA (L.); Scl. Cat. p. 104; Léot. p. 322; Taylor, *l. c.* p. 83.

An old male, similar to specimens from Cayenne, Guiana, and Columbia.

85. SPERMOPHILA LESSONI, mihi.

Pyrrhula bouvronides, Less. Tr. p. 450.

Spermophila bouvronides, Scl. Cat. p. 104.

Spermophila bouvronoides, Léot. p. 318.

Three specimens, of which two show an indistinct white line from

the base of the upper mandible to the middle of the vertex, resembling much *S. lineola*, L. But in this latter species this white line is very conspicuous; whereas in *S. lessoni* the feathers are white at the base only, and therefore the white becomes almost hidden.

Dr. Léotaud gives a very good description; that of Lesson is imperfect, the white rump not being mentioned.

A hybrid name so bad as that given by Lesson cannot be admitted; therefore I have changed it.

86. ORYZOBORUS TORRIDUS (Scop.); Scl. Cat. p. 103.

Pitylus torridus, Léot. p. 283.

Two specimens in old plumage, agreeing accurately with the description by Dr. Léotaud. The white speculum is scarcely visible, the narrow white on the base of the primaries being nearly hidden and covered by the tectrices of the primaries. Gmelin in his diagnosis (S. N. p. 854), extracted from Scopoli (Annus I. Hist. Nat. 1769, p. 140), does not mention a white speculum; and therefore this species will be the true *O. torridus*, with which *Loxia nasuta* of Spix is undoubtedly identical, and apparently *Loxia torrida* of Neuwied and Burmeister. The two last-named naturalists do not speak precisely enough in respect to the white speculum to settle the question definitely.

We possess a specimen obtained from Verreaux (named *Sporophila torrida*, from Brazil), which I cannot take to be the true *S. torrida*. It is an old bird, and agrees in every respect with the specimens from Trinidad, except that all the primaries are white at the base, forming a conspicuous white speculum, being left uncovered for nearly 3 lines; besides, this specimen has across the middle of the throat a conspicuous band of chestnut, and the longest tectrices of the secondaries show also a chestnut apical shaft-spot.

I would take it without hesitation for the *Coccothraustes rufiventris*, Vieillot (Enc. M. p. 1014), who describes the white on the base of the primaries very well; but he does not say any thing of the chestnut gular cross band. Having only a single specimen before me, I feel unable to declare its novelty; but should these differences prove to be not accidental, I would propose to call it *O. specularis*.

Long. al.	rectr. med.	rostr. a front.	latit. ad bas.	tars.	
2″ 1‴	1″ 10‴	5½‴	5½‴	7‴	(*torridus*, Trinidad.)
2 3	1 11½	6	5½	7	(*torridus*, Trinidad.)
2 1	2 1	5½	5½	7	(*torridus*, Brazil.)

I may be allowed to remark that *Amaurospiza cærulatra*, Cabanis (J. f. Orn. 1866, p. 306), from Rio, is synonymous with *Sporophila nuseta*, Hartl. (Journ. f. Orn. 1853, p. 36). Dr. Cabanis's description, especially the singular form of the bill, agrees in every respect with the type in the Bremen Museum, except that he does not say that the under wing-coverts are partially white, and the remiges have also a whitish edging on the basal half of the inner web.

87. SYCALIS BRASILIENSIS, Gmel.; Scl. Cat. p. 125.

One specimen, agreeing with Brazilian specimens.

Not included by Dr. Léotaud, and never seen by Mr. Taylor (Ibis, 1864, p. 83).

Fam. RAMPHASTIDÆ.

88. RAMPHASTOS ERYTHRORHYNCHUS (Gmel.); Burm. Thiere Bras. ii. p. 204, note.

One specimen, not different from Guiana specimens.

The size varies a good deal.

Long. al.	caud.	rostr.	tars.	
8″ 7‴	6″ 0‴	6″ 9‴	2″ 0‴	(Trinidad.)
9 0	6 0	6 8	2 0	(Guiana.)
8 3	5 9	5 9	1 11	(Guiana.)

This species is not included by Dr. Léotaud.

89. RAMPHASTOS VITELLINUS, Licht.; Scl. Cat. p. 325; Léot. p. 325; Taylor, *l. c.* p. 93.

One specimen, agreeing with a Guiana specimen in the Bremen collection.

90. PTEROGLOSSUS ARAÇARI, L.; Scl. Cat. p. 325.

One specimen, similar to another from Guiana.

Dr. Léotaud does not notice this species from Trinidad. The *P. wiedii*, Sturm, is very closely allied, and can be distinguished only by a slight difference in the markings on the upper mandible, as has been pointed out very minutely by Mr. Sturm (Monogr. Ramph. 4 Heft). *P. araçari* is not confined in its distribution to Guiana and Northern Brazil; for Prof. Burmeister (ii. p. 208) got the true *P. araçari* in Minas Geraës. The black stripe along the culmen varies in extent; in our Guiana specimen it is $5\frac{1}{4}$‴ broad, in the Trinidad one $5\frac{1}{2}$‴, in the Brazil specimen (*P. wiedii*) 4‴. The size is also variable.

Long. al.	caud.	rostr.	tars.	
5″ 6‴	6″ 0‴	4″ 6‴	16‴	(Trinidad.)
5 7	5 9	4 0	17	(Guiana.)
5 10	6 0	3 9	16	(*wiedi*, Brazil.)

Dr. Cabanis has separated a conspecies from Venezuela (*P. formosus*, Journ. f. Orn. 1862, p. 332), said to be different from *wiedii* in having the chin and throat dark red-brown, the black stripe along the culmen narrower, and in its larger size (the measurements are, unfortunately, not noticed). I doubt whether these differences, based on a single specimen, are of specific value; the dark reddish-brown tinge on the ear-coverts, on the chin and throat, is also visible in our Brazilian specimen, and, as remarked by the Prince of Wied, is peculiar to the female.

I may be allowed to append some remarks with respect to the synonymy of two *Ramphastidæ*.

RAMPHASTOS PISCIVORUS, L.

Ramphastos carinatus, Sw.; Scl. Cat. p. 324.

From this well-known species are not separable *R. brevicarinatus*, Gould (Mon. ed. 2, t. 3), and *R. approximans*, Cab. (Journ. f. Orn. 1862, p. 333), as already stated by Mr. Salvin (P. Z. S. 1867, p. 156). A careful comparison between specimens from Guatemala, Costa Rica, and New Granada has convinced me that Mr. Salvin is quite right, although Mr. Lawrence (Ann. L. N. H. N. Y. ix. p. 129) holds the contrary opinion. Our Guatemalan specimen has the yellow on the jugulum bordered very narrowly with red; in the New-Granada one this red bordering is more defined, and in the Costa-Rican bird still broader. But this is by no means a specific character; for the figure of Mr. Sturm, from a Mexican specimen, shows the red band still broader than those from Costa Rica. The measurements are also variable.

Long. al.	caud.	culm.	tars.	
7″ 6‴	5″ 10‴	5″ 0‴	23‴	(Guatemala.)
7 0	5 5	4 2	22	(New Granada.)
7 6	6 0	4 2	21	(Costa Rica.)
8 6	6 9	5 9	22	(♂, Mexico, ap. Sturm.)
—	—	4 0	—	(♀, Mexico, ap. Sturm.)

RAMPHASTOS AMBIGUUS, Sw.; Scl. Cat. p. 325.

Our specimen from New Granada agrees in every respect with the description and beautiful figure by Mr. Sturm (Heft iv. t. 1. fig. inf.), taken from a male specimen from Peru (Tschudi). The separation of the New-Granada bird (*R. abbreviatus*, Cab. Journ. f. Orn. 1862, p. 334) has no grounds in my opinion. The purple-reddish tinge on the breast, noticed as the chief character for *R. abbreviatus*, is not visible in our specimen, and again occurs in Peruvian specimens, as stated by Mr. Sturm.

Long. al.	caud.	culm.	tars.	
8″ 10‴	5″ 6‴	6″ 0‴	24‴	(New Granada.)
8 10	—	6 3	—	(Peru, ap. Sturm.)

Dr. Cabanis gives the length of bill as only a little more than 4½″; but it may be remembered that in most of the members of the *Ramphastidæ* the length of bill varies considerably, especially with respect to the two sexes and the younger birds.

The southern form of *R. toco*, which Dr. Cabanis named *R. albogularis* (J. f. Orn. 1862, p. 334), has been declared not specifically different by Von Pelzeln (Orn. Bras. iii. p. 233, note 2).

Fam. PSITTACIDÆ.

91. CONURUS PERTINAX (L.); Finsch, Mon. i. p. 506.

One specimen, in the plumage of *C. chrysophrys*, Sw., and agree-

ing with the specimen described by me (Pap. p. 512) from Brazil in Mr. Lawrence's collection. The olive-brownish feathers on the regio parotica blend into orange, the bluish feathers on the sinciput are mixed with some of orange colour, showing again a change from the plumage of *C. æruginosus* into that of the true *C. pertinax*.

This species and the following are not recorded by Dr. Léotaud. Mr. Taylor also did not obtain this species in Trinidad (Ibis, 1864, p. 94).

92. BROTOGERYS TUIPARA (Gmel.); Finsch, Mon. ii, p. 105.

One specimen, not different from specimens from Guiana, Surinam, and Brazil.

93. PIONIAS MENSTRUUS (L.); Finsch, Mon. ii, p. 441; Léot. p. 329.

A younger specimen, in the plumage described as *Pionus coralinus*, Bp. (*vide l. c.* p. 444).

94. PSITTACULA CINGULATA (Scop.); Finsch, ii. p. 677.

Psittacula batavica, Léot. p. 331; Taylor, *l. c.* p. 94.

One specimen of this species, which is apparently confined to the island of Trinidad.

Dr. Léotaud notices only five species of Parrots from Trinidad; but I am acquainted with twelve said to come from this island. They are:—

Sittace macavuana (Gmel.)	Finsch, Papag.	i. p.	415.	Léot. p. 557.
—— *hahni* (Sou.)	„	„	„	427.	British Museum.
Conurus pertinax (L.)	„	„	„	506.	British Museum.
—— *cyanopterus* (Bodd.)	„	„	„	538.	Coll. Sclater.
Brotogerys tuipara (Gmel.)	„	„	ii. p.	105.	Coll. Kohlman.
Pionias menstruus (L.)	„	„	„	441.	Léotaud.
Chrysotis festiva (L.)	„	„	„	511.	Coll. Sclater.
—— *amazonica* (L.)	„	„	„	570.	*Ps. agilis*, Léot. p. 327.
—— *ochrocephala* (Gmel.)	„	„	„	584.	British Museum.
Psittacula passerina (L.)	„	„	„	648.	Coll. Sclater.
—— *cingulata* (Scop.)	„	„	„	677.	Léotaud.
—— *hueti* (Temm.)	„	„	„	685.	Léotaud.

Fam. PICIDÆ.

95. PICUS MELANOLEUCUS, Gmel.; Sund. Consp. Av. Pic. 1866, p. 5.

Dryocopus albirostris, Léot. p. 334.

One female, as figured by Malherbe, tab. 4.

96. PICUS LINEATUS, L.; Sund. *l. c.* p. 7.

...us lineatus, Léot. p. 336.

Male and young male, not different from specimens from Brazil and Guiana (Demerara).

97. PICUS CINNAMOMEUS, Gmel.; Sund. *l. c.* p. 85.

Celeus cinnamomeus, Scl. p. 336; Léot. p. 338; Taylor, *l. c.* p. 93.

Male and female.

98. PICUS RUBIGINOSUS, Sw.; Sund. *l. c.* p. 69.

Chloronerpes rubiginosus, Scl. Cat. p. 339; Léot. p. 339; Taylor, *l. c.* p. 93.

One male, as figured by Malherbe, t. 89. f. 4. The measurements are smaller than those noticed by Dr. Cabanis (Mus. Hein. iv. p. 162).

Long. al.	caud.	rostr.
4″	2″ 3‴	c. 9‴

Fam. CUCULIDÆ.

99. CROTOPHAGA MAJOR, L.; Scl. Cat. p. 320; Léot, p. 358; Taylor, *l. c.* p. 93.

One specimen in old plumage, in every respect similar to Brazilian ones.

100. PYRRHOCOCCYX CIRCE (Bp.).

Pyrrhococcyx mehleri, Cab. M. H. p. 84.
Piaya mehleri, Scl. (nec Bp.) p. 322.
Piaya cayana, Léot. p. 346; Taylor, *l. c.* p. 93.

One specimen, agreeing with a Guatemala specimen in our collection.

101. PYRRHOCOCCYX RUTILUS (Vieill.).

Piaya minuta, Scl. Cat. p. 322; Léot. p. 349.

One specimen, similar to Guiana specimens.

102. DIPLOPTERUS NÆVIUS (L.); Scl. Cat. p. 321; Léot. p. 343; Taylor, *l. c.* p. 93.

One specimen, not different from Brazilian and Guiana birds.

Order COLUMBÆ.

103. PERISTERA RUFAXILLA (Rich.); Léot. p. 371; Taylor, *l. c.* p. 94.

Peristera frontalis (Temm.); Burm. S. Uebers. iii. p. 305.

One specimen, agreeing with specimens from Brazil and Guiana (Demerara).

Order GRALLÆ.

104. CHARADRIUS VIRGINIANUS, L.; Burm. iii. p. 357.

Squatarola helvetica, Léot. p. 389.
Pluvialis fulvus americanus, Schleg. Mus. P.-B. *Cursores*, p. 53.

One specimen in change of the plumage; the under parts being mixed with large patches of black.

Long. al.	caud.	rostr.	tars.	tib. med.	dig. med.
6″ 9‴	2″ 2‴	9‴	18‴	9‴	11½‴

As far as I can judge from a few specimens, the Golden Plover of America, most nearly allied to the *C. fulvus*, Gmel., of Eastern Asia, is a distinct species, characterized by the longer wings. But whether this character is constant I hesitate to declare with certainty, not having compared specimens enough.

105. CHARADRIUS SEMIPALMATUS, Bp.

Charadrius brevirostris, Neuw. Beitr. iv. p. 769; Burm. iii. p. 359.

Charadrius semipalmatus, Léot. p. 392; Schleg. Curs. p. 30.

Three specimens; two in winter dress, the third in full summer plumage. There is no difference in specimens from Brazil and from the United States.

106. TOTANUS SEMIPALMATUS (Gmel.); Léot. p. 457; Schleg. *Scolopaces*, p. 76.

Catoptrophorus semipalmatus, Bp.

One specimen in winter plumage, agreeing with North-American specimens.

107. ACTITIS MACULARIUS (L.); Schleg. Scolop. p. 83.

Tringoides macularia, Léot. p. 461; Taylor, *l. c.* p. 95.

One specimen in the dress supposed to be that of the young, having the under parts uniform white, unspotted, quite the same as in our *A. hypoleucus*, with which it may be easily confounded at first sight. But there exists a very good character in the markings of the outer tail-feather—in *A. macularius* only the outer web being distinctly barred with white and black, the inner web obscure greyish brown, instead of being both barred regularly with black as in *A. hypoleucus*.

108. TRINGA SEMIPALMATA, Wils.

Ereunetes petrificatus, Ill.

Tringa pusilla (L.); Schleg. Scolop. p. 55.

Heteropoda semipalmata et *H. longirostris*, Léot. pp. 477, 480.

Eureunetes mauri et *E. minor*, Gundl. J. f. Orn. 1856, pp. 419, 420.

One specimen in winter dress, which agrees in every respect with specimens from Texas, Cuba, and Sitka. The variability in the length of the bill has been noticed already by Professor Baird (B. N. Am. p. 725). Our Cuban specimen (*T. mauri*, Bp.) has the bill 8‴ long, like the Trinidad one (8‴ *E. minor*, Gundl.); in the Texan specimen the bill measures 9‴; and in the one from Sitka 11¼‴, as noticed for *T. mauri* by Dr. Gundlach. The existence of inter-

mediate specimens does not allow us to separate the long- and short-billed specimens as different species.

109. PORPHYRIO MARTINICA, L.; Burm. Syst. Uebers. iii. p. 392; Léot. p. 501; Taylor, *l. c.* p. 96.

Gallinula martinica, Schl. *Ralli*, p. 38.

An old bird, not different from specimens from Brazil and North America.

110. CANCROMA COCHLEARIA, L.; Burm. iii. p. 404; Léot. p. 436.

Two specimens in full dress. There exists a considerable variability in the size of the bill in this species.

rostr. a front.	lat. rostr.	
3″ 0‴	20‴	(Trinidad.)
2 8	18	(Trinidad.)
3 1	20	(Brazil.)
3 3	21	(Mexico.)

111. ARDEA BRASILIENSIS (L.); Burm. iii. p. 410; Léot. p. 426.

An old bird, exactly the same as Brazil specimens. Dr. Léotaud describes this species in an excellent manner, as usual.

112. ARDEA SCAPULARIS, Ill.; Burm. iii. p. 411.

Ardea grisea (Bodd.); Léot. p. 421.

? *Butorides virescens*, Taylor, *l. c.* p. 95.

One specimen in full dress.

113. ARDEA CÆRULEA, L.; Burm. iii. p. 414; Léot. p. 410; Taylor, *l. c.* p. 95.

Florida (!) *cærulea*, Baird, B. N. Am. p. 671.

Two specimens—one in the slaty-blue plumage of the old bird, the other entirely white. This latter has no elongated feathers on the scapulars or the lower neck, and is evidently a young bird.

114. ARDEA LEUCOGASTER, Gmel.; Schleg. M. P.-B. *Ardeæ*, p. 9; Léot. p. 424.

Demiegretta ludoviciana, Baird, B. N. Am. p. 663.

One specimen in the plumage of the young.

Order ANSERES.

115. DENDROCYGNA AUTUMNALIS (L.); Burm. iii. p. 436, Anm. 2; Léot. p. 507.

One specimen, agreeing with a specimen from Jamaica in the Bremen collection.

4. Notes on *Lanius excubitor* and its Allies. By H. E. Dresser, F.Z.S. &c., and R. B. Sharpe, F.L.S., Libr. Z.S., &c.

In examining the European Shrikes with a view to determine the species which really belong to the European fauna, we have found so much confusion existing that we have thought it necessary to make a few remarks on the Great Grey Shrikes and their geographical distribution; and we take the present opportunity of adding some notes respecting all the species of true *Lanius* allied to our own Great Grey Shrike (*Lanius excubitor*). With this view we have collected together a considerable series of Grey Shrikes from different parts of the world, and we venture to submit the following observations for the careful consideration of ornithologists; and, at the same time, we shall be extremely obliged for any additions or corrections to the views expressed by us in the present paper.

The following diagnostic table will show the characters of all those species which we consider to be fully established :—

a. scapularibus conspicue albo marginatis.
  a'. rostro et pedibus nigris, vel nigricantibus.
    a''. fascia alari alba duplici distincta ..... 1. *excubitor*.
    b''. fascia alari alba una.
      a'''. subtus semper vermiculatus ..... 2. *borealis*.
      b'''. subtus haud vermiculati.
        a''''. majores: supra saturate plumbei.
          aa. subtus plumbeus ..... 3. *algeriensis*.
          bb. subtus pulchre roseo indutus ..... 4. *meridionalis*.
        b''''. minores: supra cinerei.
          cc. pedibus gracilibus: secundariorum pogonio interno nigricante..... 5. *ludovicianus*.
          dd. pedibus crassis: secundariorum pogonio interno albo ..... 6. *lahtora*.
  b'. rostro et pedibus pallide brunnescenti-corneis ..... 7. *pallidirostris*.
b. scapularibus dorso concoloribus.
  a'. rectrice extima omnino alba ..... 8. *minor*.
  b'. rectrice extima versus apicem nigra..... ..... 9. *excubitorius*.

1. Lanius excubitor.

Above generally light blue-grey; forehead, extending backwards over the eye, pure white; lores, feathers under the eye, and ear-covers black; scapularies blue-grey, conspicuously edged with white; wing-coverts black, the least ones for the most part grey, the primary coverts and occasionally some of the greater coverts narrowly edged with greyish white; primaries black, white at the base on both inner and outer webs; secondaries black, the outermost white at the base on both the inner and outer web, thus forming a double bar on the wing; the secondaries conspicuously, and the primaries occasionally, tipped with white, the latter sometimes narrowly edged with the latter colour on the outer web; rump and upper tail-coverts greyish white; tail black, tipped with white, the latter colour gradually predominating towards the outer feathers,

the two outermost being almost entirely white; cheeks and the whole of the under surface of the body pure white; legs slender, dark brownish black; bill black.

Female. Similar to the male, but the under parts greyish and exhibiting slight traces of transverse vermiculations.

Young. Much duller in plumage, the black parts being mixed with brown, the under parts dirty greyish white; bill and feet brown.

This Shrike appears to vary very much according to age, the wing-coverts, forehead, and rump being of a much purer white in some specimens. The slender legs and double bar on the wing render it easily distinguishable from *L. lahtora*, which very old and pallid specimens at a first glance somewhat resemble. From *Lanius borealis* it is distinguishable by the absence of vermiculations on the breast and the double bar on the wing. The latter character, indeed, seems to be peculiar to *Lanius excubitor* alone; but we would remark that it is only gradually assumed, and, though very distinct in the adult bird, is only feebly developed and sometimes hidden by the greater wing-coverts in young specimens. It can, however, be almost always discovered on close examination.

The range of the present species extends over the northern and central portions of the Palæarctic Region as far north as the birch and willow are found. In the south of Europe it is only a winter migrant. To the eastward its range is yet undetermined; for though the Siberian travellers record it as being met with throughout Siberia, we find that the specimens collected on the Amoor and marked *Lanius excubitor* by the Russian naturalists are *L. lahtora*, as hereafter mentioned. The bird which occurs in Central Asia is also of the latter species.

We have already stated that *L. excubitor* is migratory in the South of Europe. Dr. von Heuglin states that it is a rare bird in North-eastern Africa, but he has only observed it in the winter in Egypt, and killed it in Arabia Petræa. We fully endorse his opinion, subsequently expressed, that it is probable that many of the observations as to the occurrence of the Great Grey Shrike in North-eastern Africa, made by Brehm, Rüppell, and Hemprich and Ehrenberg, refer to some of the allied species. We are inclined to question Mr. C. W. Wyatt's assertion ('Ibis,' 1870, p. 12) that *Lanius excubitor* is common in the Sinaitic peninsula; but as so good an observer as Dr. von Heuglin expressly states that he has himself shot it in that locality, we feel bound to admit its range so far south. We are, however, sceptical enough to be very anxious to see a *specimen* of true *L. excubitor* from the shores of the Mediterranean or North-eastern Africa.

2. LANIUS BOREALIS.

Lanius borealis, Vieill. Ois. de l'Amér. Sept. pl. 50 (1807); Swains. Faun. Bor.-Am., Birds, p. 111, pl. xxxiii. (1831); Aud. Syn. p. 157 (1839); *id.* B. of A. iv. p. 130 (1839); Gray Gen. of B. i. p. 294 (1847); Cass. Proc. Phil. Acad. 1857, p. 212; Jones, Nat. Hist. of Berm. p. 51 (1857); Max. Journ. f. Orn. 1858, p. 190.

Collyrio borealis, Baird, B. of N. Amer. p. 324 (1858); Coop. & Suckl. Pac. R. Rep. xii. pt. 2, p. 188 (1860); Baird, Rev. N. Am. B. p. 440 (1864); Coues, Proc. Phil. Acad. 1866, p. 73; Lord, Nat. in Vanc. Isl. ii. p. 295 (1866); Sam. B. of N. Engl. p. 269 (1867); Gray, Hand-l. of B. i. p. 391 (1869).

Lanius septentrionalis, Bonap. Sp. Comp. p. 30 (1827); *id.* P. Z. S. 1837, p. 112; *id.* Consp. Gen. Av. i. p. 363 (1850); *id.* Rev. et Mag. 1853, p. 294; Cass. Proc. Phil. Acad. 1857, p. 213; Murray, Edinb. N. Phil. Journ. ix. p. 223 (1859).

Lanius excubitor (err.), Forst. Phil. Trans. lxii. p. 382 (1772); Wils. Amer. Orn. i. p. 74 (1808); *id.* ed. Jard. i. p. 73 (1832); Aud. Orn. Biogr. ii. p. 534 (1834).

Above French grey, paler on the lower back as it approaches the rump, which, with the upper tail-coverts, is pure white; a narrow line of white extends across the forehead; ear-coverts jet-black; scapulars pale grey, tipped with white; least wing-coverts grey, tinged with rusty; wing-coverts black, the outer ones tinged with brown; quills dark blackish brown, white at the base of the inner web, the base of the outer web of the primaries white, showing a small white alar bar; secondaries tipped with white; tail black, all the feathers, except the two centre ones, white at the extreme base, and all tipped with white, this colour occupying more of the apical portion of each feather till the outermost, which are white along the outer edge and for the greater part of the inner web; under surface dull white, minutely barred with narrow transverse vermiculations, which become less distinct towards, and are sometimes absent on, the lower abdomen and under tail-coverts; bill dark horn-brown; feet black. Total length 9 inches; of bill from front 0·7, from gape 1·1; wing 4·5; tail 4·2; tarsus 0 9.

Female. Similar to the male, but has all the colours less intense, and the whole plumage tinged with ashy brown. There is also, perhaps, not quite so much white on the tail.

This is the most powerful species of the genus *Lanius*, and possesses a most extended range, as it is known to inhabit the whole of the North-American continent from the extreme north down as far south as the Mississipi and Missouri valleys. With regard to its possible occurrence in North-eastern Asia, we adduce the following facts, which are likewise referred to by Prof. Baird (Rev. Am. B. p. 442).

Pallas (Zoogr. Rosso-As. i. p. 401) describes a large Grey Shrike which he obtained on the Lena and Jenesei rivers, and which he considers to be different from *Lanius excubitor*. All ornithologists seem to coincide in the same opinion, viz. that the *Lanius major* of Pallas is only a large race of *L. excubitor*; but after comparing skins of the North-American *L. borealis* carefully with Pallas's description, we think that there is every reason to believe that this was the bird intended by the above author. Nor is there any improbability in this supposition; for the recent observations of ornithologists are proving the great similarity of the faunæ of Eastern Siberia and North-Western America, and we now know that many species are common to these two localities. At all events it seems

reasonable to suppose that Pallas had good grounds for the separation of his *L. major*; and the subject is well worth the investigation of ornithologists. We may be allowed to draw particular attention to the stress which Pallas lays on the conspicuous cross-barring, which forms so distinctive a character in *Lanius borealis*.

Radde (Reis. Süd-Ost Sib. ii. p. 274) refers to *Lanius major* of Pallas, which he considers to be only *L. excubitor*. We do not think he is right here; for apparently he had no specimens from the locality where Pallas obtained his bird, and this must be an absolute condition for the correct settlement of the question. Von Schrenk never mentions it; and we consider that our suggestion recorded above will very probably be confirmed by future observation.

3. LANIUS ALGERIENSIS.

Lanius algeriensis, Less. Rev. Zool. 1839, p. 134; Bonap. Rev. et Mag. de Zool. 1853, p. 293; Tristr. Ibis, 1859, p. 159; Salv. Ibis, 1859, p. 312; Taczan. J. f. O. 1870, p. 48.

Lanius meridionalis, Malh. Cat. Rais. Ois. de l'Algérie, p. 9 (1846); Drake, Ibis, 1867, p. 425.

Above dark blue-grey, the edge of the scapulars white; least wing-coverts grey, the rest jet-black; primaries black, white at the base, forming a very distinct white speculum, the secondaries paler on the inner web, conspicuously tipped with white; tail black, the middle feathers just tipped with white, the others black at the base, but the white predominating towards the external feathers; a narrow line over the forehead, loral space and ear-coverts black; entire under surface grey, paler on the throat and just under the ear-coverts; under wing- and tail-coverts whitish; bill and feet black.

Although closely allied to *Lanius excubitor* and *Lanius meridionalis*, there is no doubt that the present species is quite distinct from both. The bill is slightly shorter and stouter than in either of these last-named species; and the general appearance is such that we had no difficulty in distinguishing old and young specimens of *Lanius algeriensis* when mixed indiscriminately with a series of twenty specimens of *Lanius excubitor* of all ages. The back of the present bird is very much darker than that of any *Lanius excubitor*, while the uniform light plumbeous colour of the underparts effectually distinguishes it.

The differences between *Lanius algeriensis* and *Lanius meridionalis* we have pointed out in treating of the latter bird.

We have quoted but very few references for this species, as so much confusion has existed with regard to its distinctness from *L. meridionalis* and *L. dealbatus*; but there is no doubt that Dr. Tristram and Mr. Salvin (*l. c.*) refer to the true *L. algeriensis*, as their remarks respecting the geographical distribution of the species in Algeria are fully borne out by the investigation of subsequent observers. The present bird seems to be a resident species in Algeria.

Herr L. Taczanowski (*l. c.*) states that *L. algeriensis* is very common on a large plain near the Fezzara Lake. In suitable localities it is found on the northern slope of the Atlas.

4. LANIUS MERIDIONALIS.

Above dark plumbeous; scapulars somewhat lighter and having the extremities white, which show a distinct white mark when contrasted with the dark grey of the upper surface of the body; quills black, the inner web white at the base, the outer web of the primaries also white at the base, forming a small white alar bar, the secondaries tipped with white; tail black, all but the two centre feathers tipped with white, the latter colour occupying more of each feather until the two outermost, which have the outer edge of the feather almost all white as well as the apical half of the feather; a very narrow line of feathers along the base of the forehead, extending backwards over the eyes and forming an indistinct superciliary streak, white; loral space and ear-coverts black, the latter having the shafts rather distinct, which gives them a somewhat hoary appearance; cheeks and chin white; rest of the under surface of the body rose-colour, grey on the flanks; vent and under wing- and tail-coverts white; bill and feet black. Total length $9\frac{2}{10}$ inches, of wing $4\frac{2}{10}$; tail $4\frac{8}{10}$; tarsus $1\frac{2}{10}$.

The female is precisely similar to the male; but the white ends to the scapulars are not quite so broad, so that there is not such a conspicuous white patch on these parts.

Our description is taken from a very fine male lent to us by Lord Lilford, who procured it in the Coto del Rey, Audalucia, in May, 1869.

This species is nearly allied to *Lanius algeriensis*, but differs in many important characters, viz. in the total absence of white over the eye and on the forehead in the latter species, also in the alar bar being much smaller in the present bird, and in the breast being rose-coloured, whereas in *L. algeriensis* it is plumbeous grey. The bill of this species is much longer and more slender than in its Algerian ally.

As far as our investigations have hitherto carried us, we cannot but consider that *Lanius meridionalis* is a species confined to the south of France, Spain, and Portugal, though it may possibly occur along the northern portion of the Mediterranean basin. Lord Lilford, who knows the species well, assures us that he shot one specimen in Corfu (*cf.* also 'Ibis,' 1860, p. 135) in April 1857, where, however, it was "far from common." This specimen he no longer possesses; and although we have used the utmost exertion to obtain specimens of the true *L. meridionalis* shot anywhere eastward of Spain, we have been unable to procure any. Dr. Salvadori kindly informs us that the bird called *L. meridionalis* by him in his 'Catalogue of the Birds of Sardinia' he has since discovered to be only *L. minor* in fully adult plumage; and he likewise expresses his belief that the occurrence referred to by Prince Bonaparte of a specimen of *L. meridionalis* in the neighbourhood of Rome is also open to question.

Dr. von Heuglin doubts the occurrence of this bird in North-eastern Africa, where it has been accorded a place on the authority of Von Müller (Journ. f. Orn. 1855, p. 409); and in this we heartily coincide with him.

5. Lanius ludovicianus.

Lanius ludovicianus, Linn.; Baird, Rev. of Am. B. p. 443.
Lanius excubitoroides, Sw.; Baird, *l. c.* p. 444.
Lanius elegans, Baird et auct. Amer. (*nec* Sw.).

Upper parts dark French grey; rump and upper tail-coverts lighter; scapulars broadly edged with white; quills black, the inner web white towards the base, the basal half of the outer web of the primaries white, forming a white alar bar; secondaries broadly tipped with white; tail black, the central feathers just edged with white, the next more broadly tipped, this latter colour predominating towards the external feathers, which are almost entirely white; a narrow band across the forehead, lores, feathers round the eye, and ear-coverts jet-black; whole underparts white, with occasional slight indication of transverse vermiculations; bill and feet black.

Professor Baird, in his elaborate 'Review of American Birds,' has gone very closely into the question of the specific distinctions between *L. ludovicianus* and *L. excubitoroides*; but we must confess that we can scarcely agree with even so good an authority on North-American birds as the learned Professor; and we base our opinion principally on the analogous changes of plumage through which all the other Grey Shrikes appear to pass. We have not, indeed, such an extensive series for comparison as Professor Baird has at his command in the Smithsonian Museum, but have no inconsiderable number of specimens before us from various localities in the United States and Mexico. Amongst these we have thoroughly typical *L. excubitoroides* and *L. ludovicianus* (based on Professor Baird's own descriptions) from the same locality, viz. San Antonio, shot by Mr. Dresser and Dr. Heermann.

In the British Museum there is a specimen sent to this country by Professor Baird, under the name of *Lanius elegans*, from Mexico. This bird was kindly shown to us by Mr. G. R. Gray; and we were glad to see it, as it confirms our opinion that the *Lanius elegans* of the American authors is nothing more than *L. ludovicianus*.

6. Lanius lahtora.

Collurio lahtora, Sykes, P. Z. S. 1832, p. 86 (descr. orig.); *id.* Journ. As. Soc. Beng. iii. p. 423 (1834); G. R. Gray, Hand-l. of B. i. p. 391 (1869).

Lanius lahtora, J. E. Gray & Hardw. Ill. of Ind. Zool. ii. pl. 31 (1833); G. R. Gray, Gen. of B. i. p. 290 (1847); Blyth, Cat. B. Mus. As. Soc. Beng. p. 151 (1849); Bonap. Consp. Gen. Av. i. p. 364 (1850); *id.* Rev. et Mag. de Zool. 1853, p. 294; Horsf. & Moore, Cat. B. Mus. E.-I. Co. i. p. 163 (1854); Jerd. B. of Ind. i. p. 400 (1862); Hartl. Ibis, 1859, p. 342; Heugl. Peterm. Mitth. 1861, p. 23; Beav. Ibis, 1865, p. 418; Blyth, Ibis, 1866, p. 367; Finsch & Hartl. Orn. Ost-Afr. p. 327 (1870); Heugl. Orn. N.-O. Afr. p. 483.

Lanius elegans, Swains. Faun. Bor.-Am. p. 122 (1831).

Lanius burra, Gray & Hardw. Ill. Ind. Zool. pl. 32 (1833).

Lanius excubitor, var. 3, Lath. Gen. Hist. ii. p. 7 (1822).

Lanius minor, Rüpp. Neue Wirb. p. 33 (1835, *nec* Gm.); *id.* Syst. Uebers. p. 62 (1845); Heugl. Syst. Uebers. p. 33 (1856).

Lanius orbitalis, Hempr. & Ehr. in mus. Berol. et Licht. Nomencl. Av. p. 12 (1854, *teste* Finsch & Hartlaub).

Lanius collurio (juv.), Heugl. Peterm. Mitth. p. 23 (1861); *id.* Journ. f. Orn. 1867, p. 285 (err.).

Lanius pallens, Cass. Proc. Acad. Nat. Sci. Philad. 1851, p. 245; *id.* Journ. Acad. Nat. Sci. Philad. 1853, p. 258, pl. 23 (juv.).

Collyrio pallens, Gray, Hand-l. of B. i. p. 391 (1869).

Lanius aucheri, Bonap. Rev. et Mag. de Zool. 1853, p. 294; Gray, Hand-l. of B. i. p. 391.

Lanius dealbatus, Defil. Rev. et Mag. de Zool. 1853, p. 289 (ad.); Bonap. Rev. et Mag. de Zool. 1853, p. 294; Taylor, Ibis, 1860, p. 199; Heugl. Syst. Uebers. p. 33 (1856); Adams, Ibis, 1864, p. 27; Taylor, Ibis, 1867, p. 57; Taczan. J. f. O. 1870, p. 48.

Lanius leuconotus, Brehm, Journ. f. Orn. 1854, p. 147; Heugl. Syst. Uebers. p. 33 (1856).

Lanius hemileucurus, Finsch & Hartl. Orn. Ost-Afr. p. 329 (1870).

Collyrio hemileucurus, Gray, Hand-l. of B. i. p. 391 (1869).

Lanius fallax, Finsch & Hartl. Trans. Zool. Soc.

Lanius meridionalis, Tristr. Ibis, 1862, p. 279; *id.* Ibis, 1867, p. 374 (=*L. lahtora*, juv.)

Lanius excubitor, Taylor, Ibis, 1859, p. 47; Tristr. Ibis, 1867, p. 364 (=*L. lahtora*, ad.); Wyatt, Ibis, 1870, p. 12.

Lanius leucopygus, Hempr. & Ehr.; Heugl. Orn. N.-O. Afr. p. 480.

Head and back pale French grey; a narrow frontal line, extending backwards and including the loral space, the feathers above and below the eye, and the ear-coverts, which are somewhat elongated and extend on to the sides of the neck, deep black; a faint line on the forehead above the black line, and extending over the eye, hoary white; scapulars French grey, broadly edged with white; least wing-coverts grey; rest of the wing-coverts black; primaries black, slightly tipped with white, the basal half white, forming a distinct alar bar, secondaries black, broadly tipped, and the whole of the inner web white; the outermost secondaries narrowly edged on the outer web with white; rump and upper tail-coverts white; two centre feathers of the tail on each side black, slightly tipped with white, the next broadly tipped with white, the next still more broadly with white, with the basal portion and the outer web entirely white, the two exterior feathers entirely white with black shaft; the whole underparts pure white; legs and bill blackish horn-colour.

The above description is taken from a very old bird from the Punjab, and agrees with an equally old specimen from Algeria (*L. hemileucurus*, Finsch & Hartl.) *in the minutest particulars*. Nor do these specimens alone coincide; for we have before us a large series, from localities ranging from Algeria to Palestine, which exactly

agree with specimens from different parts of India. The differences supposed by various authors to be of specific value appear to us to be nothing more than those caused by the relative age of the bird: thus *L. hemileucurus* of Finsch and Hartl. is a very mature bird; *Lanius pallens* of Cassin (=*L. dealbatus*, Defil.) is the ordinary adult; and *L. fallax* of Finsch and Hartl. is the young. In the young bird there is no great extent of white on the forehead, scapulars, and rump, nor are the underparts of so pure a tint. Young birds generally have the underparts tinged with grey.

We should not have ventured thus to unite species which have been reckoned distinct by some of the first ornithologists of the day, without sufficient material to warrant us in this determination; and we may state that we have examined a numerous series of specimens from all parts of Algeria, Tunis, Egypt, Abyssinia, Palestine, many parts of India, and even Amoor Land, from our own collections and those of the following noblemen and gentlemen who have placed their Shrikes at our disposal, viz. Lord Walden, Lord Lilford, Professor Newton, Rev. Dr. Tristram, Messrs. Sclater, Salvin and Godman, and Swinhoe, to whom we take this opportunity of returning our best thanks for their courtesy.

From all the other Shrikes this species is preeminently distinguishable by the thickset rough leg and white back. The only bird which at all approaches it is *Lanius algeriensis*, to which the young of *L. lahtora* bear a slight resemblance, but which could not for a moment be mistaken for it even in that stage of plumage, owing to the very dark tint of the head and back in *Lanius algeriensis*.

Mr. Swinhoe has very kindly lent us two specimens collected in the Amoor Land by Dr. Maack, the one adult, the other immature. The former, on comparison with very adult specimens of the so-called *Lanius hemileucurus* from Algeria, and old *Lanius lahtora* from the Punjab, is *absolutely similar in every respect*, while the young bird from the Amoor Land precisely agrees with a typical specimen of *Lanius fallax* from Abyssinia. Père David, in his list of Peking birds (Nouv. Archiv. iii., Bull. p. 35) states that he has obtained a large Shrike, which he calls *L. major*, Pall., rather rarely in that neighbourhood; and he also includes another species under the name of *L. meridionalis*, Temm., which, however, has been identified by M. Jules Verreaux as the young of *L. excubitor*. We think that the birds here mentioned belong to the same species as the Amoor bird in Mr. Swinhoe's collection. Père David says that the old bird has a tinge of pink on the breast. We have also noticed this in Mr. Swinhoe's specimen; but as it sometimes occurs slightly on adult birds from other localities, we do not affix any specific importance to the fact.

Lanius lahtora has probably the most extended range of any of the Grey Shrikes, occurring along the southern shores of the Mediterranean basin, through the countries bordering the Red Sea, Palestine, and thence throughout the whole of India extending northward to the Amoor country. We have seen specimens from Central

Asia, thus connecting its range from Palestine to India. This species is undoubtedly the southern representative of *Lanius excubitor* in the western Palærctic Region; but we have not sufficient authority to state clearly the range of this last-named bird in the eastern portion of the Palæarctic Region to give the exact extent in this direction, so that the point where the two species meet has yet to be determined. Throughout Northern Africa, from Algiers to Egypt, it is not uncommon, and in Palestine is the common Shrike of the country, according to Dr. Tristram (Ibis, 1867, p. 364), who, however, on this occasion confounded the bird with *Lanius excubitor*, as we find from an examination of the specimens collected by him, and kindly lent to us for the present paper.

In Algeria this species, according to Herr Taczanowski, takes the place of *L. algeriensis* on the southern slope of the Atlas and in the deserts.

We have the advantage of possessing in this country the type specimen of *Lanius elegans* of Swainson, which is preserved in the national collection. On a close examination this bird seems to be nothing more or less than *Lanius lahtora*, to which species we have accordingly referred it. Whether the identical specimen described really came from the Fur Countries as stated, can only be determined by further investigation in the locality whence the type specimen is said to have come; and this question will, doubtless, be set at rest some day by the American ornithologists. It seems possible to us that the Shrike in question may have come from some other locality altogether, or it may be a straggler from Northern Siberia into North-western America.

Before concluding our remarks on this species we may state that Dr. von Heuglin in his new work admits *Lanius leucopygus*, Hempr. & Ehr., and *L. lahtora* as two distinct species. The former name he assigns to the bird called *L. dealbatus* by most ornithologists: but we must protest against the resuscitation of the name *L. leucopygus*; for on turning to the passage quoted (Symb. Phys. *d*, *e*) we fail to find any account of the species, and we cannot allow this name to take precedence of *L. lahtora*, as Hemprich and Ehrenberg do not seem to be very clear on the subject and evidently regard their *L. leucopygus*, whatever it may be, as a hybrid.

7. LANIUS PALLIDIROSTRIS.

Lanius pallidirostris, Cass. Proc. Acad. Nat. Sci. Philad. 1851, p. 244; *id.* Journ. Acad. Nat. Sci. Philad. 1853, p. 257, pl. 23.
Collyrio pallidirostris, Gray, Hand-l. of B. i. p. 391 (1869).
Lanius pallidus, Antin. Cat. Coll. Ucc. p. 56 (1865).

Head and back pale whitish grey; a line on the forehead and over the eye white; loral space dusky grey; ear-coverts black; scapulars edged with white; least wing-coverts greyish white, the rest black; quills brownish black, white at the base, the external web of the primaries at their base white, forming a distint alar bar; rump and upper tail-coverts greyish white; centre tail-feathers black tipped with white, the white predominating towards the outermost

feathers, which are almost entirely of the latter colour; cheeks and entire under surface of the body white; bill and feet pale yellowish horn-colour.

This bird is easily distinguishable from other allied species, not only by its pale plumage, but more particularly by the light colour of the beak; and hence its name.

It was described by Mr. Cassin from a specimen in the Museum of the Philadelphia Academy, said to have been obtained in "Eastern Africa." Our description is taken from a specimen in Mr. Sharpe's collection from Nubia (*Verreaux*); and the bird is probably confined to the Abyssinian subregion. Heuglin says that it occurs in Southern Nubia, Senaar, Kordofan, on the Nile, and in the warmer portions of Abyssinia to the Red Sea.

8. Lanius minor.

Adult. Above delicate French grey; wing-coverts black, the least ones mixed with grey; quills black, the inner web pure white at the base; the outer web of the primaries also white at the base, forming a broad white alar bar; the innermost secondaries narrowly tipped with the same colour; the four centre tail-feathers entirely black, the next two white at the base and tip, black in the centre of the feather, the next two similar, but with less black, and the two outer ones on each are entirely white; a broad black band across the forehead, extending backwards over the eye to the ear-coverts, which are also black; entire under surface white, tinged on the breast and sides of the body with delicate pink; bill and feet black. Total length 8 inches, wing $4\frac{7}{10}$, tail 4, tarsus $\frac{9}{10}$.

The above description is taken from an adult specimen in Lord Lilford's collection.

Lanius minor is generally distributed during the summer season throughout Central and Southern Europe, extending as far north as the Baltic provinces; but in winter it migrates to Southern Africa, whence a great many specimens have been forwarded to England by the late Mr. C. J. Andersson, principally from Damara Land. To the eastward it extends into Siberia, having been recorded as occurring there by Pallas under the name of *Lanius vigil*.

9. Lanius excubitorius.

Lanius excubitoroides, Prevost et Des Murs, Lefebr. Voy. en Abyss. p. 99, t. viii. (1849), *excubitorius* in plate.
Lanius excubitorius, Heugl. Orn. N.-O. Afr. p. 478.
Collyrio excubitorius, Gray, Hand-l. of B. i. p. 390 (1869).
Lanius princeps, Cab. Mus. Hein. Th. i. p. 73 (1850).
Lanius macrocercus, Defil. Rev. et Mag. de Zool. 1853, p. 290.
Lanius kiek, Vierth. Naum. 1852, pt. 2, p. 7; 1857, p. 103.

Above pale French grey; scapulars black; both upper and under wing-coverts black; quills black, the inner web pure white at the base, the outer web of the primaries also white at the base, thus forming a conspicuous alar bar; the innermost secondaries faintly tipped with

dirty white; rump and upper tail-coverts white; tail-feathers black, the basal half of all, even the centre ones, pure white; across the forehead a broad band extending back nearly to the middle of the head; loral space and ear-coverts black, this colour extending from the ear-coverts to the shoulder and forming a continuous black band; throat, cheeks, and whole underparts pure white, bill and feet black.

This bird is nearest allied to *Lanius minor*, which it somewhat resembles from the broad black band on the forehead, but is easily distinguishable from that and other allied species by the long particoloured tail, which never has the outer feathers pure white, but invariably deeply tipped with black, and also by its black under wing-coverts.

This species, like *L. pallidirostris*, seems to be confined to North-eastern Africa. Lord Walden has a specimen collected by Petherick on the White Nile, while our description is taken from a fine specimen from North-eastern Africa in Sharpe's collection.

5. List of Birds collected by Mr. Cuthbert Collingwood during a Cruise in the China and Japan Seas, with Notes. By R. SWINHOE, F.Z.S.

Mr. Cuthbert Collingwood, the author of the highly appreciated 'Rambles of a Naturalist,' brought home from his cruise in the China and Japan seas a collection of birds, captured for the most part at sea, and submitted them to Mr. Osbert Salvin. The latter gentleman placed them in my hands, and desired me to draw out a list of them, adding the collector's notes and any remarks I should like to make. This I have done, and now offer the results to this Society. Mr. Collingwood's notes and numbers are given between inverted commas.

1. POLIORNIS POLIOGENYS (Temm. & Schleg. F. J.).

"No. 13. Hawk, male. Eye very black; iris yellow. Near south end of Formosa; seemed to be making a passage; a great many hovering round about the ship. Small crabs in crop. 26th March, 1864.

"No. 14. Hawk, female, caught same time as No. 13. Crop full of remains of shells, insects, and grass. Bird remarkably fat."

For a similar occurrence of this bird at nearly the same time of year, see 'Ibis,' 1867, p. 412.

2. ACCIPITER STEVENSONI, Gurney, Ibis, 1863, p. 447, pl. 11.

"No 46. Sparrow-hawk, a male. 11th May, 1866. N. lat. 30°50′, E. long. 123° 10′. Coast of China, near Saddle Island. Iris crimson; narrow belt outside of it under the eyelid; eyeball dark. Back slate-

colour; belly and legs mottled. Part of a Swallow in gizzard, and quantity of grass."

This specimen was submitted to Mr. Gurney for identification.

3. BUDYTES FLAVA (L.).

No label. In nuptial dress with grey head, the eyebrow, chin, and line under ear-coverts being white.

4. CALOBATES BOARULA (L.).

"No. 45. Male. Iris with slight tinge of dark brown. Olive-green along the back. Breast and belly bright yellow. Tail white and green. Gizzard full of remains of insects. N. lat. 30° 50′, E. long. 123° 10′. Coast of China, near the Saddle Islands, 11th May, 1866."

5. TURDUS FUSCATUS, Pall.

"Nos. 58 & 59. Thrushes, both young males. Nagasaki, Japan, 24th February, 1867."

6. MICROSCELIS AMAUROTIS (Temm. & Schleg.).

"Nos. 60 & 61. Nagasaki, Japan, 24th February, 1867."

7. HIRUNDO GUTTURALIS, Scop.

"No. 24. A Swallow, male. Near Quelpart Island, N. lat. 32°, E. long. 127°, 16th April, 1865.

"No. 39. Female. N. lat. 23° 10′, E. long. 122° 5′. East coast of Formosa. Crop full of remains of insects."

8. HIRUNDO DAURICA, Pall., var JAPONICA, T. & S. F. J.

"East coast of Japan, east of Boungo Island."

9. TCHITREA PRINCIPALIS (T. & S. F. J.).

"No. 42. 8th May, 1866. Male. Ring round the eye and cere and bill light blue; legs chestnut. N. lat. 25° 10′, E. long. 122° 40′. Coast of China."

In the live bird the legs also are blue, but get discoloured almost immediately after death.

10. RUTICILLA AUROREA (Pall.).

"No. 28. Male. Straits of Corea, 9th April, 1865."

11. CALAMOHERPE ORIENTALIS (Temm. & Schleg. F. J.).

No label.

12. ARUNDINAX CANTURIANS, Swinhoe, Ibis, 1860, p. 52.

"No. 32. Male. Coast of China, off Foochow. N. lat. 25° 30′, E. long. 120° 10′."

13. LOCUSTELLA OCHOTENSIS, Midd. Sib. Reise.

"No. 49. Male. 30th August, 1866. Saddle Islands."

14. Regulus japonicus, Bp.

"Nos. 20, 21, & 23. Tits or Honey-suckers; 21 and 22, females, 23, male. Japan Sea and Straits of Corea. 9th April, 1865."

The special labels are wanting; so one does not know to which individuals the numbers refer. All three have pale yellow crests, and look to be females.

15. Troglodytes fumigatus, Temm. & Schleg. F. J.

There is unfortunately no label.

16. Fringilla montifringilla, L.

"No 27. A male caught on the coast of Corea, N. lat. 34° 40′, E. long. 130°, 10th April; died 7th May, as we advanced south towards Hongkong, in N. lat. 27°.

"No. 28. Mountain-finch, male. Eye brown-black; iris dark grey. This bird was also kept in a cage, same as No. 27. Caught on east coast of Japan, N. lat. 39°, E. long. 142°, 7th November, 1864."

17. Eophona melanura (Gmel.).

"No. 26. Male. Shot, Woosung River, near Shanghai, China, 2nd May, 1865."

18. Cyanopica cyana (Pall.).

"No. 25. Male. Woosung River, near Shanghai, China. Crop full of rice. 3rd May, 1865."

19. Garrulus brandtii, Eversm.

"Female. Hakodadi, 4th November, 1865."

20. Turtur gelastes, Temm. & Schleg. F. J.

"No. 46. Male. Iris orange. N. lat. 33°, E. long. 127° 30′. 30th October, 1866."

"No. 56. Female. Nagasaki, 21st February, 1867."

21. Coturnix dactylisonans, Temm.

"No. 47. Male. Iris yellowish brown. N. lat. 33°, E. long. 127° 30′. 30th October, 1866.

"No. 48. Female. Caught the day after No. 47. Numbers of these birds are met with every year during the latter end of September and all October, making their way to the south."

The male has the black mark still showing on the throat. The female has a white throat.

22. Coturnix japonicus (T. & S. F. J.).

"No. 44. Iris hazel. Very fat when taken. Japan Sea. N. lat. 41°, E. long. 139°. 26th September, 1866."

The throat red, with no black mark.

23. Glareola orientalis, Lath.

"No. 17. Male. Iris chestnut; white semicircle round the lower eyelid; eye large and elongated; under wing-feathers red. N. lat. 19°, E. long. 120°. North end of Luzon, 20th April, 1865."

24. Tringoides hypoleucus (L.).

"No. 40. Female. 7th May, 1866. Eyes dark. Crop empty. N. lat. 24°, E. long. 122°. East coast of Formosa."

25. Buphus coromandus (Scop.).

"No. 38. Crane, female. 8th May, 1866. Gizzard containing remains of snails, and worms alive (seeming parasites), of pure white, about ¾ inch in length. Iris bright yellow; eyeball dark blue. N. lat. 25° 50′, E. long. 122° 50′. Coast of China."

26. Porzana erythrothorax, Temm. & Schleg. F. J.

"No. 54. Male and female. Iris crimson. N. lat. 32° 20′, E. long. 125° 80′. Between coast of China and the Corea. Body literally covered with fat."

27. Phalacrocorax carbo (L.).

"No. 45. Cormorant, female. Iris green; eye dark blue; yellowish green under the head. Very fat when caught. N. lat. 39°, E. long. 138°. Japan Sea, October 1866."

28. Sula fusca, L.

"No. 15. Gannet, female. Eye black; iris stone-grey. Small flying-fish in crop. Bird very lean. Feet and bill yellow. N. lat. 20°, E. long. 116°. China Sea. 14th April, 1864.

"No. 26. Gannet, male. 7th May, 1866. Eyeball indigo; iris straw-colour; light blue ring round the eye. N. lat. 24°, E. long. 122°. East coast of Formosa."

29. Larus melanurus, Temm. & Schleg. F. J.

"No. 20. Gull, female. Red circle round the eye. Shot in Hakodadi harbour, North Japan, March 1865.

"No. 42. Gull, gender uncertain. Red round the eye and base of the beak. Hakodadi, June 1866."

30. Sterna panayana, Scop.

"No. 121. "Hakodadi. 4th November, 1865."

Two others without labels. From North Japan one would rather have expected *S. fuliginosa*.

31. Anous stolidus (L.).

"No. 29. Male Noddy. Eye black; iris dark grey. N. lat. 28° 40′, E. long. 129° 30′. Loochoo Islands. July 1865.

"No. 38. N. lat. 23° 10′, E. long. 122°. North-east coast of

Formosa. *Sterna*, a male. Eyeball dark indigo; iris dark chestnut. Gizzard empty, collapsed."

32. URIA UMIZUSUME, Temm. & Schleg. F. J.

"No. 57. Diver, young male. Nagasaki. 24th February, 1867."

33. PHALERIS TETRACULA (Pall.).

"Male. Eye grey. 19th February, 1865. N. lat. 40°, E. long. 142°. North-east coast of Japan."

6. On *Phoca grœnlandica*, Müll.: its Modes of Progression and its Anatomy. By JAMES MURIE, M.D., F.L.S., F.G.S., &c., late Prosector to the Society.

(Plate XXXII.)

Propulsion of mammals on land and on different substances, as is well known, is effected in a variety of ways; and the parts brought into contact with the solid matter are as diverse. Walking, running, leaping, bounding, hopping, creeping, &c. sufficiently express widely dissimilar modes of progression. Some raise the body in erect or semierect posture, as in Man and Kangaroos; others, and by far the greater number, carry the body horizontally above, and support it by the four feet. Some, as the Sloths, suspend the body, and slowly move along the boughs by successive clutches.

As regards the parts in opposition with the object moved on, the palms and soles respectively or together frequently form the fulcrum. The toes of the manus and pes, however, as often alone touch the ground; but the knuckles, rims of soles, and even tips of claws, as in the Three-banded Armadillo, are, in certain instances, brought into requisition as fulcra. The tail even assists as an occasional basis of support, and in such cases as the Spider Monkeys and Merian Opossum, the body is absolutely hung and swung forwards thereby.

But perhaps the oddest kind of movement, and almost sadly ridiculous one, is the shuffling, wriggling, belly-progressive gait of many of the Seal tribe on *terra firma*.

Several writers* have called attention to this peculiarity in the Common Seal, *Phoca vitulina*, and contrasted it with the very different walk of the other Carnivora. The Sea-lion (*Otaria*) by the the old Southern voyagers†, and the Walrus (*Trichechus*) by Arctic travellers‡, have each been described as walking waddling-fashion on all fours; and the living specimens lately in our Gardens have

* See the early Anat. Memoirs of the French Acad.; also "Sur les organes du mouvement du Phoque commun," by Duvernoy, Mém. du Muséum, 1822, p. 52.

† Capt. Cook, the Brothers Foster, Dampier, quoted by Duvernoy (*l. c.* p. 51), Péron & Lesueur, &c., besides Steller, who describes fully the northern species.

‡ Beechey's Voy. Lamont's 'Seasons with the Sea Horses,' &c.



J. Berg ... del et lith.

M&N.Hanhart imp.

PHOCA GROENLANDICA.

brought the fact before our eyes. These two kinds of land-motion, abdominal and quadriplantigrade, are all, to my knowledge, that have been recognized among the family of Phocidæ.

Nevertheless a third sort of land-movement, intermediate between those mentioned, is the habit of certain Phocine species; and to call attention to this is the chief object of the present paper.

A few Greenland Seals (*Phoca grœnlandica*, Müll.) were purchased by the Society in May 1869; and then for the first time this species was exhibited in the Gardens to the public. To most observers, unacquainted with the varieties of Seals, these animals exhibited nothing to distinguish them from the Common Seal of our coast, if seen with the skin wet. But when dry they did show, even to the unpractised eye, a difference, in their whiter coats; and, instead of minute regular dark spots, irregular bands and slashes of a black hue intermingled with sparse circular spots arrested the attention. In some of the specimens, barely adult, at least not old, the broad loin-patch of a deep blackish shade was moderately developed—this being the marked external characteristic of the species, and, in fact, from which the popular names of Harp-seal and Saddle-back are derived.

Having given attention to the modification of walk and somewhat vermiform land-action betwixt the Otary, Morse, and the Common Seal, I was both surprised and delighted to find that the Saddle-back at times moved on the ground quite differently from either. A good idea of the difference of attitude of the two latter is best gathered from the illustration, Plate XXXII. It represents, from sketches taken of the live *P. grœnlandica*, one of these animals (that in the foreground) moving in its usual manner, after the fashion of the Common Seal—that is, belly-wise, the fore limbs tucked towards the chest, the hind legs thrust backwards and in apposition.

The remaining four figures, however, vary considerably in attitude; and each is characteristic of what I have oft witnessed in the Harp-seal, and I may add the "Bladder-nose" (*Cystophora cristata*), lately added to the collection, but never have seen in the Common and the Ringed Seal (*P. fœtida*). The Greenland Seal, in fact, very often uses its fore limbs, placing these on the ground in a semigrasping manner, and by an alternate use of them drags its body along. The hind legs meantime are either trailed behind slightly apart, or with opposed plantar surfaces slightly raised and shot stiffly behind. On uneven ground, or in attempting to climb, a peculiar lateral wriggling movement is made; and at such times, besides alternate palmar action, the body and the hind legs describe a sinuous semi-spiral or wave track, as shown in the figure to the left.

Dr. Pettigrew, in his admirable memoir on the mechanism of flight*, has carefully analyzed the swimming of the Seal, Sea-bear, and Walrus; and in my papers on the anatomy of the two latter I have alluded to their movements on land; so that further comparison here is unnecessary.

To the theory of evolution the matter I have been dilating on is

* Trans. Linn. Soc. vol. xxvi. (1867) p. 207.

an accession, inasmuch as gradation of limb-use is most easily traced throughout the Carnivore series. Take the Common Seal; and its limb-appendages on land are but of slight subservience to progression, the fore paws only occasionally being used among rocks. In the Harp and Bladder-nose Seals, the fore legs and paws, and, to a very moderate extent, the hind limbs are freely brought into action. Among the Otaries there is a very decided plantigrade mode of walk, the heels, however, being much restricted as to change of position. With a very similar style of walk and canter, the Walrus has more freedom of motion, from the extremities being less fixed. It is but an easy step to the Bears, flat-footed and moderately free-legged. A still further modification in manner of walk and limb-forms leads on through the Otters and Binturong to the more agile digitigrades, the Cat tribe.

For an excellent notice of the variation of colour, geographical range, migrations, &c. of this species of Seal, see P. Z. S. 1868, p. 416. The author, Mr. Brown, since the present plate was drawn, has called my attention to a very characteristic illustration of hundreds of these animals among the pack-ice, in the Swedish Expedition to Spitzbergen*. I was glad to find the artist has shown that the attitudes here noticed in confinement are precisely those *P. grœlandica* exhibits in a state of nature. Being ignorant of Swedish, I unfortunately cannot refer to the text.

It was not until I had well thought over this paw-creeping movement of the Northern Seal that I fully appreciated an incident related to me by my friend Mr. Charles Davidson, which he had been witness to in one of his arctic voyages. At more than a mile distance from their ship a solitary Seal was noticed lying dosing near an "escape-hole" on the ice. An Esquimaux thereupon, in his seal-skin garment and hood formed quite like the head of the animal he was in pursuit of, and with lance and rope-coil, slowly crawled towards the creature. For a while it apparently took little notice of him, but at last showed indications of being on the alert. The man by this time was still far off; but the moment he observed the Seal watching him, he advanced perfectly Seal-fashion, and whilst it steadily gazed, evidently mistaking him for one of its species, as he at times imitated to very life every phocine movement, he approached within a very short distance. Then suddenly starting up he sent his lance whirling into the creature's vitals ere it could scramble in safety to the blow-hole.

Without further digression I may state that from time to time, as the Greenland Seals succumbed to the changed conditions of confinement, I took the opportunity of examining their anatomy. I particularly made it a point to dissect the fleshy and tendinous structures, which I thought by organization would explain those peculiarities of land-progression above-mentioned.

I was fortunate in being able to compare, side by side, the bodies of *P. vitulina* and *P. grœnlandica*, and also placed before me some

* "Anteckningar om Djurlifaet i ishafvet snellan Spetsbergen och Gronland." Af Aug. Quennerstaedt. Kongl. Svenska Ak. Handl. 1868, Band vii. no. 3, p. 12, Taf. i. fig. 1.

carefully executed drawings of the limb-myology of *P. fœtida*. It is needless entering into detail; but the result was that I detected no special arrangement in the muscles and tendinous distribution, both of the pectoral and pelvic extremities, which could satisfactorily account for the powers of grasp and differentiated raised creeping movements.

In all three forms the flexor and extensor tendons agree in pattern and points of insertion. The small palmar and plantar muscles, including superficial and deep layers of interossei, are subdivided after the same fashion. As regards the shoulder and brachial muscles, there is no alteration in their implantation; and hence no change in mode of action is apparent. If any specific difference exists, it must be in the volume and strength of the individual parts. But this is a factor which, unless very decided, the eye cannot well appreciate; therefore to assume such is all that reasonably dare be ventured. Physiologically, it may be said there is more innervation; but that can neither be seen, weighed, nor measured.

I shall restrict my notes of the internal anatomy to a single specimen, premising that the differences in the others examined by me were slight—chiefly relating to partial or deeper segmentation of the lungs and length of intestine.

Meckel, in his 'Anat. Comp.,' merely incidentally alludes to *P. grœnlandica*, quoting the 'Naturhist. Bemerk. &c.,' of Thienemann; but I regret I have not been able to lay hands on this latter work.

In a young male which died of congestion of the brain the following admeasurements were taken by me:—Extreme length = 4 feet 3 inches. Of this, regionally, from the edge of the upper lip to the occiput was 9½ inches; from the occiput to the tip of the tail 34½ inches; from the occiput to the tip of the hind flipper 41½ inches; the free part of the fore flipper 7½ inches; and the free portion of the hind limb 10½ inches.

The body weighed 41 lbs.; the skin when removed 6 lbs. 2 oz., and the viscera, including the tongue &c., 5 lbs. 2 oz.; the brain with its membranes and blood-vessels (the latter much congested), 8 ounces 2 drachms.

In the specimen under consideration the heart presented a well-defined bifid extremity, the cleft being almost half an inch deep. The long diameter of the heart from root to apex was 3 inches, and the greatest transverse diameter near the base 3¾ inches. Others of the Greenland Seals did not show quite so deep an apical incision; but in all, traces of separation at the point were discernible. I infer that in *Phoca grœnlandica*, at a comparatively ripe age, nearly if not quite adult, this fœtal stage of heart-cleft obtains. But latitude must be given to such a premise; for I have observed once in a young Porpoise, *Phocæna communis*, with a length of body as great as the Seals, that a distinct division of the apex existed. In the Harp-seal this cardiac scission is very median in position, as in the Dugong and Manatee, and not so laterally placed as I found it in the Common Porpoise.

The right lung was entire or without divisionary lobules; but the

left lung presented a slight incision or was very partially divided into two lobes.

The tongue, as is usual in the Seals, was terminally split rather than forked. The dorsal papillæ were very numerous and of small size.

The œsophagus had a length of 16 inches. As is the case in the Common Seal, the rather capacious stomach was cylindroid, and with the pyloric bend sharp; its long diameter was 11 inches. The small intestines from the pylorus to the cæcum measured 41 feet 5 inches, with an average diameter of ½ an inch. As in *Phoca* generally, the cæcal diverticulum is simple, short, and wide. Including ½ an inch of cæcum, the great intestines had a length of 18½ inches; their diameter, ¾ of an inch at the cæcal end, gradually enlarges towards the vent, and is 1¼ inch at the rectum. The entire alimentary tube at this stage of growth is therefore about 45 feet 2½ inches long.

The deeply divided liver precisely corresponds as to disposition, number, and size of the lobes, with those of the Ringed Seal (*P. fœtida*, Müll.) and to the Common Seal (*P. vitulina*); namely, there are five large elongate taper-pointed hepatic divisions, and two lobules —in all, seven lobes. The two to the left are the homologues of the left half of human anatomy; and the right half is represented by the three remaining large lobes; of these three the mesial two are equivalent to Professor Owen's cystic lobe. The Spigelian and caudate lobules are relatively small. The common bile-duct, derived from the pyriform gall-bladder, opens into the intestine an inch distant from the pyloric orifice.

The kidneys are compound or acinate; and externally large veins ramify superficially upon the renal capsule, as is the case in the Common Seal.

The generative organs comport to the type of Pinnipedia. The prostate gland is of moderate size; Cowper's glands are absent.

In passing, I may note that the vertebral formula is:—7 cervical, 15 dorsal, 6 lumbar, 4 sacral, and 13 caudal segments, or a total =45 vertebræ. Terminal caudal elements are often lost in museum skeletons; but in this case they were counted whilst attached by intervertebral substance and ligament.

7. On a probably new Species of *Tænia* from the Rhinoceros. By James Murie, M.D., F.L.S., F.G.S., &c., late Prosector to the Society.

The Cestoida, abundantly numerous among the ruminant section of the Artiodactyla, are by no means so common or well known in the non-ruminant division of that group. Regarding the Perissodactyla, its few families and genera have as yet not yielded many varieties of these Entozoa.

In the very lucid and capitally illustrated 'Introduction to Hel-

minthology,' Dr. Spencer Cobbold says, "The larger Pachyderms and Solidungulates harbour a few adult forms; but only the larvæ appear to be known in Swine; a true *Tænia*, however, has been described as occurring in the aberrant genus *Hyrax*." The same writer, in an examination of 122 different animals, which died in the Society's Gardens (1857–60), only came across two supposed new species of *Cysticerci* and a *Strongylus* among the Perissodactyles *.

Rudolphi in his 'Synopsis,' Diesing in his elaborate 'Systematic Treatise,' and Dujardin in his 'Hist. Nat. Helm.' make no mention of Tapeworm from *Rhinoceros*.

When Dr. Baird published his 'Catalogue of Species of Entozoa' (1853) there were comparatively few species in the series from the Ungulata; many additions have since been made; but still in the British-Museum collection at present there is no representative of Tæniadæ from the Rhinocerotidæ.

That gentleman, with his usual urbanity on all occasions, readily lends assistance when research in his department is sought; and I take this opportunity of thanking him for his many kindnesses.

A couple of years ago some dozen joints of what I may safely term an enormous Tapeworm were placed in my hands by Mr. Bartlett, they having been passed by the young male *Rhinoceros indicus* in the Gardens. I had drawings made of the most characteristic pieces thereupon, and before shrinkage ensued. These sketches are reproduced in the accompanying sketch (fig. 1). I searched carefully among the fragments, but did not discover a head. The cephalic segment (so essential for the identification of the species) being wanting, I waited, thinking, perchance, more pieces might afterwards be thrown out, and it among them. As not only a reasonable time, but a long period has now elapsed, and nothing further been obtained from the *Rhinocerotes* (for I understand the female when young exhibited symptoms of worms), I have less hesitation in publishing what I know (though imperfect data) than in postponing a notice until the tænoid head is forthcoming.

The largest proglottid joint among those obtained is that marked *D* in the woodcut; it is 1·6 inch broad and 1·1 inch long. The smallest of those figured (*A*) measures 0·6 across and 0·5 inch in extreme length. There was still another piece, 0·1 inch less in both dimensions; but this was put in spirits and shrunk before the drawing of the others was finished; so I have not thought proper to include it in the illustrations I now give. Its shape was similar to *A*; and both of these segments possibly were from the front part of the body. The sizes of different species intermediate between what I have mentioned are given in the outlines *B*, *C*, *E*, *F*.

I regard the worm under consideration as belonging to the genus *Tænia*, from the position of the genital apertures being lateral or marginal, and not mesially placed as is the case in *Bothriocephalus*.

* "List of Entozoa," P. Z. S. 1861, p. 117, and also p. 93 ("Cystic Entozoa"); but Cobbold since acknowledges that Leuckart has corrected him on the score of specific difference of one specimen obtained.

intendent. He stated that on his opening the door of the inner stall to clean away refuse, the Deer passed quietly out minus its right horn, and that accidentally it tapped its left horn against the door-post, which horn thereupon tumbled off, bone and all, as I now exhibit it. Little or no blood was lost, as I have already mentioned; a slight clot formed, but no serious gush of blood took place.

29th May. Animal apparently going on well; no bad symptoms.

End of June. Daily I had looked at the creature, and things progressed favourably. At this date the right horn had grown as a good knobby projection. The vacuity in the skull had filled up; and indications of the probability of a left horn being developed were apparent, but not very decided.

During July the beam of the right horn had increased considerably; and ere the month had passed the brow-tyne began to shoot forward. By the middle of the month no doubt existed of a horn coming forth on the left side; the bony deficiency was complete; and from the large tuberous mass and velvet covering, a young horn was distinct. Pedicel and a burr were deficient, the horn springing in an indefinite manner from the osseous prominence. The end of July saw a fair-sized horn.

In August considerable growth of both horns took place; the right was higher and far in advance of the left, which was both lower set and irregular as to its division. On August 31st, or three months after the accident, the two horns presented the appearance indicated in the sketch (*A*); viz. the right horn had a considerable-sized backwardly produced tyne, and an equally well-formed up-curved single brow-tyne. The tyne of the left horn was shorter than the right one, and rather expanded terminally; the brow-tyne ***was bifid, not single***, the snags each shorter and straighter than on the right side, and with a horizontal direction.

On the 14th September I noted "that since last date the growth of both horns had gone on steadily, the left making good headway." A week after this I made a memorandum that the malformation of the left brow-tyne was becoming more and more marked, by the snags being relatively shorter than on the right side; but the difference of size of left and right beams was less, though they were still unequal.

An oily-looking perspiration exuded from both horns.

As winter and spring went on the horns attained each a good size, the malformation of the left, as above described, remaining a notable feature.

The horns thrown off on the above date (28th May, 1868), which I now exhibit, were very much alike, but not quite identical in pattern. They approach Blyth's figure No. 16 (P. Z. S. 1867, p. 840), his Pegu and Munipur variety. There are two short terminal bifid snags, however, on the beam of the right; and what usually is a vertical snag rising from the root of the beam in the left horn, in our specimen comes to the inner side and partially from the root of the brow-tyne. The divisional measurements give 14½ inches of length in the beams, 6½ inches for the brow-tynes, right basal snag 1 inch, and left basal snag 2½ inches.

8. On a Case of Variation in the Horns of a Panolian Deer. By James Murie, M.D., F.L.S., F.G.S., late Prosector to the Society.

The variability in size, general contour, and number of snags in the horns of Deer is proverbial. Not only from youth to age do these change, but in the adult of a single species, as Blyth *, among others, has shown, the modifications occasionally are not a few. Notwithstanding the danger of error likely to arise from such an unstable character as differentiation in horn-contour of the Deer, numerous instances could be cited where naturalists have formed new species on such data; palæontologists have not been behind hand in following their example.

Whilst many supposed laws regarding malformations have from time to time been enunciated by those studying the subject, there yet remains much to be done ere the precise relations between mere variety and so-called abnormalities are cleared up.

For these reasons I have thought it useful to place the subjoined case on record.

A male Panolian Deer (*Cervus eldi* †) was presented to the Society by Mr. Grote through Colonel Phayre.

On the morning of the 28th May, 1868, this animal shed its horns. The right horn loosened and fell away from its burr in the natural manner; but the left one, instead of separating from the burr, tore this latter and a portion of the osseous cranium right off with it.

I arrived at the Gardens at an early hour, and found Mr. Bartlett rather concerned at the occurrence, as from the great hole in the animal's skull he feared untoward consequences—the more so as the loss of such a rare species of Deer would cause a gap in the collection not easily repaired. Having looked at the horn and its firmly adherent osseous piece (I confess, with astonishment), Mr. Bartlett and I proceeded to the enclosure; and there sure enough was the Deer, harmless and timid, but jauntily trotting about as if nothing particular had happened. At once I felt reassured as to a favourable result on learning little or no bleeding had occurred, though I must own the great cavity left looked any thing but promising. Both of us inclined to think that the flies might soon prove a nuisance, and by clustering into the gap or depositing their eggs, cause much irritation, besides producing evil issue and retardation of the healing-process. I suggested the application of tar to the part, first, as excluding air, and, secondly, to keep off the flies. The healing-process proceeded not only satisfactorily, but far beyond expectation, as shall further be related.

Prior to comment, I allude to the keeper's report to our super-

* "Notes upon Three Asiatic Species of Deer," P. Z. S. 1867, p. 835.

† Figures of this identical specimen in different and intermediate stages of horn-growths to that here described will be found in a paper in the forthcoming No. of the 'Transactions,' by Dr. Sclater, pls. xxxvii. & xxxviii.

the animal's death; this, however, did not turn out to be the case. The morbid appearances were shortly as follows:—Intense congestion and thinning of the walls of the small intestines, these containing a great amount of flatus. Great intestines perfectly healthy, and loaded with normal fæces. All the other abdominal and the thoracic viscera were quite sound. The brain and the parts around the left horn-base, after careful scrutiny, yielded no appearances of disease or lesion. I considered death to have resulted from acute enteritis.

The woodcut (fig. 1 *B*) represents the renewed antlers at the time of death, the animal then being probably over three years old. The right horn agrees pretty nearly with Blyth's figure (No. 15). The left has a more erect beam, and with only rudiments of terminal snags; the brow-tyne is represented by two subequal snags. There is no distinct burr, this horn rising with a large base close to the skull. Length of right beam $26\frac{3}{4}$, and of left 21 inches. Right brow-tyne $12\frac{1}{2}$ long. Inner snag of left brow-antler $6\frac{1}{4}$ inches, tip inwardly curved; outer snag $5\frac{3}{4}$ inches, and with a slight outward sweep.

Remarks.—It appears to me a few legitimate deductions may be drawn from the case I have just related.

1. It proves that the pedicel of a Deer's horns and portion of the cranial bones when torn away *at the period of shedding* are not only repaired by a fresh irregular osseous mass, but redevelope thereupon a new horn. From the experience of others, I understand it would be doubtful, if horns were in an active growing state and such an accident were to happen, whether they would be renewed again.

2. But a minimum of blood was lost—showing that not only the vessels to the horn itself but also those of the forehead must have been in a contracted condition; else greater hæmorrhage would have resulted.

3. That in this Panolian Deer the horn of succession was malformed, the deviation consisting in an extra development of snag and alteration in direction—this abnormality, when uniform on both sides, (within certain limits) being considered by some naturalists of specific value. By such a character and nodulation of the superficies Dr. Gray separates his *Panolia platyceros* from his *P. acuticornis* = *P. eldi*.

4. That variation of the reproduced horn was probably coordinate with, or in fact due to, fissive growth of the blood-vessels. Hence it follows that a slightly altered blood supply produces corneous variability, this by inheritance producing the so-called varieties and ultimate species—*i. e.* where animals are specifically subdivided by form of horns, as notoriously is the case among Deer.

5. This multiple reproduction of hornlets is possibly correlated with similar multifission of the tail of Batrachians and Fishes, which, as experiment has often shown, produce a double tail on the caudal appendage being severed.

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SCIENTIFIC MEETINGS

OF THE

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OF LONDON

FOR THE YEAR

1870.

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9. Catalogue of the Mammals of China (south of the River Yangtsze) and of the Island of Formosa. By Robert Swinhoe, F.Z.S.

Primates.

1. Hylobates, sp. (Gibbon.)

A species of black Gibbon is said by the Chinese to exist in the country west of Canton. It may be the same as the animal found in Hainan, which I have attempted to identify with the *H. pileatus*, Gray (see *anteà*, p. 224). The British Museum has a young specimen of *Presbytes maurus* (Schreber), and an adult *Silenus veter* (Linn.), both presented by Mr. John Reeves, who brought them with him from China (see List of Mamm. Brit. Mus. 1843). But it is very doubtful indeed whether either of these species occurs within our limits; they were probably procured at Canton, whither merchant ships or junks had brought them. The evidence is not sufficient to justify our admitting them into the Chinese list of mammals. Friends who have travelled through forests in the mountains of the Fokien province have informed me that they have seen troops of monkeys in some places; but I have never had the good fortune to meet with any of these tree-monkeys.

2. Macacus sancti-johannis. (St. John's Monkey.)

Inuus sancti-johannis, Swinh. P. Z. S. 1866, p. 556.

This rock-monkey is found on most of the small islands about Hongkong, and is like a Rhesus with a very short tail. The young specimen taken alive by Commander St. John, R.N., on North Lena Island, did not live to maturity in the Gardens of the Society; and therefore it was not determined at home whether the species is really a valid one. Dried bodies of this animal split in two are often exhibited, hanging from the ceiling, in druggists' shops, in Canton and Hongkong; and its bones are used for medicinal purposes. Its closest ally is the Pig-tailed Monkey (*Macacus nemestrinus*, Is. Geoffr.) of Tenasserim; but it seems to me to be a distinct race.

3. Macacus cyclopis. (Formosan Rock-monkey.)

Macacus cyclopis, Swinh. P. Z. S. 1862, p. 350, pl. xlii.; 1864, p. 380; Sclater, P. Z. S. 1864, p. 711 (woodcut).

The specimens that were living in the Society's Gardens have died, and are now mounted in the British Museum. These adults are strongly tinged on the upper parts with olive-green, freckled with darker colour.

The Rock-monkey of Hainan appears to be the ordinary *Macacus erythræus*. (See *anteà*, p. 226.)

4. Nycticebus tardigradus (Linn.). (Slow-paced Lemur.)

Has been brought alive from Canton, and presented to this Society

be found in P. Z. S. 1862, p. 356 (species allied to *Kerivoula formosa*).

At Takow, where Bats are very scarce, I was walking on the 5th July, 1865, under a grove of trees. One tree had large leaves and lilac-like flowers. Close to a bunch of flowers, between some big leaves, I observed a cluster of some roundish things which I took at first for fruit or some kind of gall-nuts. One of the clusters moved, and I saw that they were the heads of Bats. They were hanging head downwards from the stem of a leaf in a bunch one against the other, their heads only showing, their bodies being hidden by the leaves. There were about ten of both sexes,—one female with a young one at her breast, and her breasts much swollen. Their colour was light yellow, the wings being variegated with orange and brown. I procured several specimens, and sent them to England. Some of them came into Prof. Peters's possession; and he has identified the species as that described by Mr. Tomes. But surely the habits of this species would show that it is not a typical *Vespertilio*!

13. VESPERTILIO CHINENSIS, Tomes, P. Z. S. 1857, p. 53.

Brought from South China by Mr. Fortune.

"VESPERTILIO DAVIDII, Peters." (David's Bat.)

Dr. Peters had this species for examination from the Museum at Paris. It was sent home by Père David. It has not yet occurred in South China, and therefore I do not number it.

14. "VESPERUGO ABRAMUS (*et* AKAKOMULI), Temminck." (Chinese House-bat.)

The female is a rich brown, with lighter and dusky underparts; the male is black. I procured the former in Hainan, and the latter in Canton. They were common in the settlement at Canton of an evening in April.

15. "VESPERUGO PIPISTRELLUS, Daub.?" (Small House-bat.)

Dr. Peters marks my specimen from Formosa with a query. This is a very common species at Taiwan (capital of Formosa), and thousands may be found clustered together in the old Dutch fort within the walls of the city. I have no specimen from South China; but it doubtless must occur there also.

16. "VESPERUGO IMBRICATUS, Temminck." (Imbricated House-bat.)

A common species at Amoy.

17. "VESPERUGO PULVERATUS, Peters, n. sp." (Grizzled House-bat.)

"In form of ear and tragus similar to *V. maurus* of Europe, but the tragus apparently not double-toothed. Wings extending to the

base of the toes; point of tail exserted. Base of interfemoral membrane very sparingly furnished with hair.

"Form of teeth similar to those of *V. pipistrellus*, the first upper premolar being much larger than in *V. maurus*.

"Hair black, on the upperside with very short, beneath with longer brownish-grey tips.

	millims.
"Total length about	85
Head	18
Ear	12·5
Tragus	55
Forearm	34
Tibia	13
Foot	8"

I have specimens from Amoy taken in August and September. It is not a common species.

18. "VESPERUGO MOLOSSUS, Temminck." (Molossus Bat.)

Dr. Peters has this species from Hongkong.

"VESPERUS SEROTINUS, Schreber." (Evening Bat.)

A very common species in summer evenings about the city of Peking. I do not number it, as I do not know of its occurrence in South China.

19. SCOTOPHILUS PUMILOIDES, Tomes, P. Z. S. 1857, p. 52.

Brought from South China.

20. "SCOTOPHILUS HEATHII, Horsfield." (Heath's Bat.)

About five inches in length, with snuff-brown upper and snuff-yellow underparts; very common in Canton in April and May, flying about in large numbers over the Foreign Settlement.

21. "SCOTOPHILUS TEMMINCKII, Horsfield." (Temminck's Bat.)

Smaller than the last, brown above, much paler below; occurred in numbers in company with the last, in the same place.

22. DYSOPES (MOLOSSUS) RUEPPELII. (Large-eared Tailed Bat?)

Dysopes (*Molossus*) *rüppelii*, Temm. Monogr. de Mammalogie, i. pl. xviii.

I procured a specimen of a Bat some years ago at Amoy which greatly resembled Temminck's figure, though it could hardly be the same as that species, which is from Egypt. My specimen was sent to England, and, I believe, is now in the collection of Mr. R. Tomes. Somes notes will be found on its peculiarities in P. Z. S. 1862, p. 11. The animal I speak of was brought to me alive on the 25th Nov. 1859. It was an adult male, and measured from snout to root of tail 4·3 inches; tail 1·2; expanse 15·5; ears 1·1, protruding beyond snout; breadth across the ears 2. Its skin was

soft and mole-like, of a deep brown, with a madder-tint, lighter on the underparts. The membrane extending from the tail to the legs was wrinkled, and covered the tail like a glove, so as to slip up or down as the creature wished to expand or contract its interfemoral wing, or, in nautical language, to shake out or take in reefs. The toes on each hind foot were five in number, of nearly equal length, the outer one thicker, all with longish pale hairs, chiefly at their tips; sides of the upper lip and upper surface of ear furrowed or grooved. Eyes small, and nearly hidden in the recess formed by the protruding ears. The living animal carried two species of parasites, one winged and the other wingless. These have been described and figured by Mr. H. Giglioli, in the 'Proceedings of the Microscopical Society' for 1863, as *Strebla molossa* and *Polyctenes molossus*.

I have often, on a cloudless evening, at Amoy, seen these Bats flying along high in the air, being easily distinguished by the narrowness of their wings. When irritated, the creature has a habit of exposing its tail by the process above described, and of sinking its eye into the socket, and thrusting it out again.

Insectivora.

23. Talpa insularis. (Formosan Blind Mole.)

Talpa insularis, Swinhoe, P. Z. S. 1862, p. 10.

Found in the hills of the north end of Formosa. A Mole occurs about Peking which M. Alphonse M.-Edwards has distinguished as the *Scaptochirus davidianus* (Annales des Sciences Nat. 5e série, t. 7), *antea*, p. 450.

24. Talpa, sp.

I have a Mole from Foochow, China, which resembles the Szechuen species; but, owing to the present troubled state of Paris, I have not been able to compare it.

25. Sorex murinus, Linn. (Musk-rat.)

Sorex myosurus, Pall.
S. swinhoei, Blyth, J. A. S. xxviii. 285.
S. albinus, Blyth. J. A. S. xxix. 90 (the young).

The Common "Musk-rat" is found throughout China, Formosa, and Hainan, in houses in large towns. Has an unpleasant musky odour, and a peculiar chatter, like the chinking of money (Swinh. 'Zoologist,' 1858, p. 6224; P. Z. S. 1864, p. 382; P. Z. S. 1870, p. 231).

26. Sorex ——? (Small Shrew.)

Sorex ——?, Swinhoe, P. Z. S. 1864, p. 382.

The two little Shrews I took under decayed dung on a hill at Tamsuy, Formosa, and mentioned before (*l. c.*), I sent in spirits to Paris, but do not at all know what has since become of them.

27. ERINACEUS ——? (Hedgehog.)

I have heard of Hedgehogs occurring at Taiwan (Formosa), at Amoy (P. Z. S. 1864, p. 378), and in Hainan (*antea*, p. 237), but I have never been so fortunate as to procure a specimen from any of these localities. They are common about Peking; and I have lately brought to the notice of this Society the Peking species, and proposed to name it *E. dealbatus* (*antea*, p. 450).

CARNIVORA.

28. URSUS TIBETANUS, F. Cuvier. (Black Bear.)

Helarctos tibetanus, Swinhoe, P. Z. S. 1862, p. 351.
Ursus formosanus, Swinh. P. Z. S. 1864, p. 380.

The Tibetan Black Bear is found in the mountains of the Shantung promontory; and I procured thence a living specimen, which is now in the Gardens of the Society. But the Black Bear of Formosa I long suspected to be distinct; and a young animal I procured at Taiwan seemed to confirm my view. It had the face as black as the rest of the body, instead of brown as in the individual from Chefoo. The animal from Taiwan also reached England alive, and may be now seen alongside of the other black Bears. Mr. Bartlett tells me he can see no distinction between it and the true Tibetan form. At Taiwan I obtained two flat skins of the Formosan Bear in the adult state; and these would show that the animal attains a very large size, fully equal to the biggest specimens from the Himalayas; but my skins exhibit, in addition to the crescentic white patch on the breast, a large round white spot on the belly. This Mr. Bartlett tells me he has also seen in the Bears from India. I procured a good series of the skull of our Bear from the aboriginal tribes of the central mountains, who dedicate them to the Great Spirit of the Chase; and in these I cannot find any noticeable difference from the skulls of the Himalayan species in the British Museum. We must allow, then, that the Formosan Black Bear is simply the Tibetan Bear, which appears also to occur in Hainan, and probably throughout the mountains of China generally. I extract a note on the Formosan Bear from the 'Taiwanfoo Gazetteer':— "Bears have hair stiff as bristles, and their coat is thick and shaggy; the arrow's head cannot pierce the body. Their feet are strong, and with their claws they can climb trees, on the summits of which they will sit cross-legged, or they will burrow into the earth and dwell there. People capture them by stratagem. Before they have carried young their bellies contain much suet that is eatable; their paws, however, are the tit-bits (lit. the one of eight pearls). Hashed and roasted, these afford a true relish; but it is no very easy matter to cook them properly."

Brown Bears, or "Men Bears," as the Chinese call them, are said by the natives to occur in the mountains of South China; but I have never seen any. In North China, I have been informed by friends, Brown Bears are taken about by showmen, and made to dance and

do various tricks at fairs. These will probably be of the species acquired by the Society in 1867, and figured in woodcut as *Ursus piscator*, Pucheran (P. Z. S. 1867, p. 817).

29. MELES LEPTORHYNCHUS, Alph. M.-Edwards. (Chinese Badger.)

M. chinensis, Gray, P. Z. S. 1868, p. 207 (figures of skull).

Of this species "the skull," remarks Dr. J. E. Gray, "is so like that of *Meles leucurus* from Thibet that I should have regarded them as the same, if there were not so much difference in the length, and flaccidness and coloration of the fur, and the abundance of the under-fur. This may depend on the climate. The shortness and peculiar colour of the fur are exactly alike in the specimens sent by Dr. Harland from Hongkong, and by Mr. Consul Swinhoe from Amoy. I may observe that when Dr. Harland's specimen was sent it was regarded as a young *Arctonyx collaris*." (Cat. Mamm. 1869, p. 127.)

The first of this species was brought to me at Amoy on the 17th July, 1867, in so badly wounded a state that it soon died. It was a male, and measured from the snout to the root of the tail 22 inches: tail 6; from carpal joint of fore leg to tips of claws 4·75; from shoulder to carpal joint 8·25; sole of fore foot 2·2 long, 1·1 broad, longest claw ·6; hind foot 2·8. Length of head 5·1; tip of nose to corner of eye 1·7; from ear to ear across head 2·45; breadth of ear 1·5; edge of upper lip to base of projecting nose ·75.

Hair of upper body coarse, about 1·5 inch long. Nose and nails brownish flesh-colour. Soles of feet pale flesh-colour. Band under nose brown, with a narrow side border of same to lower lip. A band of black about an inch wide runs along either side of the head, from near the snout across the eyes, and terminates broader just behind the ear. A broad stripe of buff-white runs from the nose to the occiput, and another of the same colour on either side of the face (including angle of mouth, with a narrow strip round chin) to below and beyond the ear; ear black, with a buff-white border to its upper half. Underparts and limbs black; upper parts somewhat densely clothed with short pale buff woolly under-fur; the upper-fur long and coarse, and also pale buff with dark centres, giving a grizzly appearance to the coat. Tail plain light buff. Teeth somewhat worn. The fur had many lice, but I only detected one flea.

On the 19th July a male and female were brought to me, the latter very large and very old, with few teeth remaining, and these quite worn down. They were both fresh killed. The female had four teats on the belly, and two on the abdomen, just between the fore part of the thighs. She measured 31·5 inches, with a tail of 7·25 to its bony tip, and hairs extending 2·25 beyond; between ears across head 2·75. Her hair was much longer, especially on the tail; and she was much more tawny on the upper parts. Neither of them had the black and white face-markings so distinct as in the younger animal of the 18th June.

Later on in the summer I procured several more, and noticed that in some the white central face-streak gets almost obliterated by being smeared with black.

In the hills of the Tinggan District, near Amoy, these animals appear to be common. They lie torpid in their holes during winter, but in summer come down to the fields of sweet potatoes, which they root up and eat. The natives call them "Sweet-potatoe Pigs," and lie in wait to shoot them with matchlocks. The flesh is not esteemed by the Chinese, and only the poorest classes eat it.

Our South-China animal, as M. Alphonse M.-Edwards has lately shown me, is of the same species as that sent to Paris by Père A. David from the neighbourhood of Pekin. This Badger, therefore, must have an extensive range. A second species also occurs near Pekin, the *Meles leucolæmus* of A. M.-Edwards. *M. ankuma*, Temm. & Schleg., is from Nagasaki (South Japan). In Formosa I noted no Badger.

30. HELICTIS MOSCHATA. (Musky Tree-civet.)

Helictis moschata, Gray, P. Z. S. ii. p. 94; 1865, p. 153; Cat. Mamm. 1869, p. 142.

Mr. Reeves originally brought this animal from Canton. I have got it from the neighbourhood of Amoy, and lately found it offered in the market at Shanghai. The Shangai specimens are more tinged with orange-yellow on the underparts, and in colouring come near the Formosan species.

31. HELICTIS SUBAURANTIACA. (Orange-tinted Tree-civet.)

Helictis subaurantiaca, Swinhoe, P. Z. S. 1862, p. 355, pl. lxiv.; Gray, P. Z. S. 1865, p. 153; Cat. Mammals, 1869, p. 142.

This species is found throughout the wooded hills of Formosa, but in the north end of the island it attains its richest colouring. In the south, near Takow, a specimen was brought to me quite pale, and scarcely differing in outward appearance from the former species.

Dr. J. E. Gray has pointed out (*l. c.*) the chief characteristics that distinguish this from its Chinese and Nepaulese allies.

32. MARTES FLAVIGULA (Bodd.), var. XANTHOSPILA. (Yellow-necked Marten.)

This fine Marten was procured by my hunter in the forests of the central mountains of Formosa. It differs from Himalayan specimens in the British Museum in having the dark colour of the head less extended on the hind neck, and grizzled with white on the occiput, and in having the sides of the neck bright golden yellow. The skull is unfortunately within the skin, and so is not handy for comparison. Head purplish brown, grizzled with white on the occiput. Behind ear and backwards a long broad spot of purplish black. Chin, upper lips, and in a line backwards to lower edge of ear, throat, central streak of chest, and a stripe between the hind legs white. Sides of neck rich golden yellow. Fore part of back and fore

quarters light brown washed with golden. Body above and below light purplish brown, becoming nearly black on hind quarters, hind legs, and tail. The fore legs are deep purplish brown, paler on the front; claws whitish. The brown of the head ends abruptly backwards, with a transverse golden line edging it. Length from snout to root of tail 20 inches; tail 14·5, with 2 inches of hair beyond. Length of head 4·25; greatest breadth 2; breadth between ears 1·75. Hind foot from tarsal joint 3·50; sole-pads small; claws short, deep, and well-curved.

I only procured the single specimen in Formosa, and have never heard of its occurrence in South China; but as the Indian animal is, according to Dr. Jerdon, very widely spread in Hindostan and its archipelago (Mamm. of Ind. p. 82), this Marten is likely enough to be found in suitable localities in China also.

33. MUSTELA SIBIRICA (Pall.). (Red House-stoat.)

Vison sibirica, Gray, P. Z. S. 1865, p. 117; Swinhoe, Zoologist, 1858, p. 6223.

Lives in the walls of houses in most of the towns in China, and feeds on Rats and Snakes. I have seen them in Tientsin, Amoy, and Formosa, and have heard of them in most places that I have visited in China (see *antea*, p. 238).

The following note was made on a fresh male specimen at Amoy, about two-thirds grown:—

Length of head 3·2 inches, from its junction with neck to root of tail 10·5; tail 9·75 (including 1·2 of hair at tip). Height of ear 1·25; depth of head near ears 1·75; breadth between ears ·75, between eyes ·7; greatest breadth of head 1·75, of nose ·4, of eye ·4; from rictus to tip of nose 1·2, to end of lower lip ·75.

Hair of a uniform light chestnut throughout, with paler underfur, slightly tinged with grey. Chin and round nose white, with some white on the under neck. Face in front of eyes blackish brown, with a little brown on the crown. Moustache-hairs brown. Claws light brown colour.

34. LUTRA CHINENSIS. (Chinese Otter.)

Lutra chinensis, Gray, Loudon's Mag. Nat. Hist. 1836, p. 580; P. Z. S. 1865, p. 126; Swinhoe, Zoologist, 1858, p. 6224; P. Z. S. 1861, p. 390; 1864, p. 381.

Found all over South China; frequents the sea-coasts as well as inland waters. On the 27th January, 1867, some fishermen brought me a fine male that had crept into their boat to steal the fish. It was dead, but still warm. I took down the following notes of its appearance:—

From snout to root of tail 25 inches; tail 16·5, in girth at base 6 inches, tapering to a point, with about ·4 length of hair beyond tip, making a complete point. Ears small and rounded; breadth between them across head 3·25; length of head 5·25; breadth between outer angles of eyes 1·3, between inner angles 2; eye in dia-

meter ·5; breadth of muzzle 2·2. Length of fore leg from shoulder to tip of claws 7·75; of hind leg from hip to tip of claws 9·5. Girth of neck 10·25, of body 13.

Throat, under neck, and round upper jaw white, with light buff under-fur. Sides of head and neck between fore legs and on their underside whitish with brownish under-fur. Breast and belly brownish white, with deep buff-brown under-fur. Upper parts, tail, between hind legs, and anal region deep glossy brown. Fore feet with light yellowish buff on the three central toes; nails flesh-colour. Nose black; irides dark; lips flesh-red, washed with black; teeth white. Feet beneath brownish flesh-colour, with blackish-brown pads.

In the Ichang Gorge, 1110 miles up the river Yangtsze, we came across a fisherman with a trained Otter. It was very tame and gentle, but he kept it chained in his boat. To make use of its services he would throw his large loose net, weighted at the edges, and let the Otter into the water fastened by a long string: the Otter would swim and dive round the outer edge of the net, driving the fish under the net, which gradually contracted its edges until it was drawn up. The fisherman would then call the Otter, giving him a jerk or two, and it quietly returned to its corner in the boat. The Otter appears also to be used in India for a similar purpose (Jerdon, Mamm. of India, p. 87).

35. LUTRA SWINHOEI. (Swinhoe's Otter.)

Lutra swinhoei, Gray, P. Z. S. 1867, p. 182.

Dr. J. E. Gray has founded this species on the skull taken out of the skin of a young Otter from Amoy (not Formosa as stated), which I sent home, in company with a larger one from the same place. Dr. Gray observes (*l. c*) that the skull in question "has a very large square tubercular grinder, and a very large rounded internal lobe to the flesh-tooth, as in the second section," which he has called *Lutrogale*. He adds that the species "is easily characterized by the small size of the upper cutting-teeth, the series forming only a width of 4½ lines; while the series of most other Indian Otters occupy 6 lines (or half an inch), or sometimes rather more." The specimen that was sent to Dr. Gray I had alive at Amoy on the 27th August, 1859. It had been captured at Gawkang, an island close to Amoy. I judged it to be about four months old. It was very gentle, and followed me about like a dog; it delighted in rolling about the floor scratching and biting itself, or would sleep rolled up on the door-mat. When left alone it would utter loud cries like that of a young chicken in distress, and when hungry a long series of sharp jarring notes. It measured 21 inches, less tail 8; length of head 4, breadth of head 2·5, across lips 1·7, height of head 2; breadth of eye ·4, of nose ·6. Fore leg 3·5, across expanded foot 1·3; hind leg 3, across hind foot 2. Upper parts rich dark brown; under parts yellowish brown, nearly white on the tips, cheeks, throat, and fore neck. Ears small, and nearly concealed. Feet well palmated, with bare pinkish-brown soles and short white nails. Lower bristles over the lips white, the upper brown.

A species of *Aonyx*, or clawless Otter, is found in Hainan (*see antea*, p. 229); but none of this group has turned up either in South China or Formosa. *Lutronectes whiteleyi*, Gray, P. Z. S. 1867, p. 181, is a long-tailed species from Hakodadi, North Japan.

36. FELIS TIGRIS. (Bengal Tiger.)

Felis tigris, Linn.
Tigris regalis, Gray, P. Z. S. 1867, p. 263.

Tiger-skins are always purchasable at the fur-shops in Canton; and, from their moderate cost, there is no reason to disbelieve the statements of the dealers, who affirm that they are procured on the hills to the westward of that city. In 1858 several made their appearance on the bare hills of the country near Amoy, and committed much depredation on the live stock of the farms, and in some instances killed and injured the natives. One of these animals swam across to Amoy on the 2nd of February, and appeared in the early morning squatting, cold and exhausted, outside a temple in the lower part of the town, or suburb of Ey-mun-kang. It was hunted into a house and locked in. The roof was then partly uncovered, and some soldiers were called to dispatch it with matchlocks. This they did by firing down through the roof. The dead beast was suspended to a bamboo pole, and carried by four men in triumph through the town. I had it brought into my courtyard and examined it. It was a male, and measured from the snout to the root of tail 64 inches, tail 30; fore leg from shoulder 33; circumference of foot 13, footpad 4; length of head 14, depth of head 9, circumference of head 29; space between ears 9; length of ear 5·5; length of upper canine tooth 2; circumference of body round thorax 40; hind leg 33; circumference of foot 12. Circumference of hind body (round abdomen) 35; round humerus 18, round femur 19, circumference of tail 9·25. It weighed 330 lbs. The skin of this animal was presented to the temple in front of which the poor beast in life was first sighted, and was afterwards used as a carpet for the chief idol on the shrine. The bones were purchased for medicinal purposes by the Taotai, or Governor of Amoy; and its flesh was sold in the streets at 4*s*. a pound as a preservative against smallpox. Its stomach was empty.

On the 11th November of the same year I chanced to meet a Tiger myself. I was on the shore of the mainland opposite Amoy in the afternoon looking out for small birds, in company with a friend. I carried a gun, but had only small shot and one cartridge. Some villagers came running to us crying "Go and shoot the Tiger." I thought they were making game of us, until some of them assured us that there really was a Tiger in a neighbouring village, and that they would be much obliged if we would kill it. They led us to a village at the foot of a hill near the shore, where we found men, women, and children huddled outside in great alarm, many of the men armed with matchlocks. They desired us to take off our boots, and one of the men guided us over the roofs of the houses to the last house near the hill, and, pointing to a large rock, he bade us listen. We

could distinctly hear growls, and peering over I saw the lips and feet of a tiger under the overhanging rock. The house on which we stood presented a wall facing the rock, and about two yards distant. We went inside, and I persuaded the owner to make a hole in the wall. I had no means of drawing the charge of my gun, so rammed down a cartridge on the top of the small shot in one barrel, and a few hollow buttons into the other. In the hurry and excitement, no bullets or iron nails were forthcoming. The Tiger noticed the hole in the wall, but only growled. I fired the button-barrel first, aimed at its neck, but he only answered by a growl, and I saw that the buttons had done no more than turn up the skin, without penetrating. His face was full towards me, and I gave him the cartridge right between the eyes. He gave a furious roar, and bounded into the garden, where he stood for a few seconds bleeding from the nose, and with his tongue lolling from his mouth. I had no more cartridges with me, so I loaded again with the hollow caged buttons which the villagers tore off their coats for me. The Tiger had moved away, and I tracked him by his blood into a dilapidated temple. I looked in at the window, and there stretched beside a coffin sat the noble beast. He turned his head and growled as he saw me; and, without a moment's thought, I raised the barrels and fired another shower of buttons at his face. I turned and fled; but a roar followed which I never shall forget, and I found myself, breathless, at the bottom of a precipice, with my gun upraised, expecting to see the angry creature upon me; but, strange enough, he did not follow. The villagers, who were assembled two hundred yards away, all ran when I ran; but seeing the Tiger did not pursue, one of them came forward and put me on his knees, and patting me on the back, helped to bring back my breath, which I had lost by the fall. We crept up to the window again. Every one of the thick wooden bars had been knocked out by the force of the leap; but from the blood only splashing the outside of the window, it was evident the Tiger had not come out of the building. We looked in at the window, and just below, outstretched on the floor in a pool of blood, lay the Tiger. I threw up my hat, and shouted to my friend, who watched the proceedings at a distance, that the Tiger was dead. At the noise the Tiger raised his head and growled. He was a Cat, of course, and had the usual nine lives. I went to the villagers, and proposed a joint attack, but they would not consent. Some of them ascended the hill behind, and fired on to the roof of the house in which the Tiger was sheltered. It was getting dark, so, breathless and hurt, I took boat and returned to Amoy. A few hours after the Tiger is said to have moved away; but whether he died or survived his wounds, I could never satisfactorily learn, so contradictory were the stories told.

In 1859 and 1860 Tiger-cubs were offered in the market at Amoy for sale, and one of them was kept alive by a friend for many months. It eventually died, and I exhibited its skin before this Society on the 23rd of June, 1863*, comparing it with a skin of a Tiger from India of about the same age. It differed a little in the markings of

* See P. Z. S. 1863, p. 237.

its rump and tail, but not more than might be attributable to individual variation.

At Foochow and Ningpo Tigers have also shown themselves in the surrounding country, and the animal is well known to the natives throughout China as the Lao-hoo.

The Tiger in the north of China grows to a very large size, seven to eight feet from snout to tail, and is clothed with much longer and denser hair. Skins of this northern race are brought to the port of Newchwang from Mantchuria. I exhibited one of them at the meeting of this Society on the 13th of January, 1870, and pointed out its peculiarities (see *antea*, p. 3). This skin is now in the British Museum; but it will be necessary to procure a skull to determine whether there really is sufficient difference to justify separating the Tiger of the snows from the Tiger of the tropics.

37. Felis pardus (Linn.) (Leopard.)

Leopardus pardus, Gray, P. Z. S. 1867, p. 263.

Found in various parts of South China. Judging from skins procured at Canton, the Chinese race is of a much richer yellow colour, and has the spots larger and blacker than is usually seen in skins from India.

Leopardus japonensis, Gray, P. Z. S. 1862, p. 262 (*L. chinensis*, Gray, P. Z. S. 1867, p. 264), is the representative form in North China and Mantchuria (see *antea*, p. 4).

38. Felis macrocelis (Temminck). (Clouded Tiger.)

Neofelis macrocelis, Gray, P. Z. S. 1867, p. 265.
Leopardus brachyurus, Swinhoe, P. Z. S. 1862. p. 352.

The acquisition of a skull and a properly stuffed animal during my last sojourn in Formosa satisfactorily proves that the insular form of "Clouded Tiger" is merely a small race of that of the Continent. My specimen was a male, and measured from the snout to the root of the tail 28 inches, tail 23. Its head is small, and its feet large. It is of a rich buff ochre colour, with deep-black spots and markings. Underparts nearly white, with large brownish-black markings.

A large flat skin of a female, brought at the same time, was of a paler and yellower tinge; and that of a younger animal was brighter still, with a green wash over the yellow, the fur being longer and shaggier than in the two adults.

39. Felis viverrina, Bennett. (Asiatic Wild Cat.)

Viverriceps bennettii, Gray, P. Z. S. 1867, p. 268, fig. 5 (skull); Swinhoe, P. Z. S. 1862, p. 7.

The flat skin I brought home from Formosa in 1862 was identified with this species. I have not since succeeded in getting an entire animal; so it is not certain whether ours is the same as the Himalayan species. Flat skins like the Formosan are also procurable in shops in South China.

40. FELIS CHINENSIS. (Chinese Tiger-cat.)

Felis chinensis, Gray, Mag. Nat. Hist. vol. i. p. 577 (1837); P. Z. S. 1867, pp. 274, 400.

Leopardus reevesii, Gray, List of Mamm. Brit. Mus. 1843, p. 44.

Felis javensis, Scl. Cat. of Vert. p. 22 (1866).

This little Tiger-cat is the commonest wild cat in Formosa and South China. I procured a good skin and skull of an adult and of a young one in Formosa, and sent thence to the Society a living example in 1866, which, however, unfortunately died in the Gardens soon after landing. I have also flat skins of it from the Fokien hills and from Shanghai. The British Museum has specimens brought from Canton by Mr. J. R. Reeves many years ago. It is a forest species, and is extremely wild and irritable in confinement.

The skull of the Formosan adult female is of a long oval form, measuring in length 3·4 inches, breadth across malar arches 2·25, breadth behind orbital spine 1·1; greatest breadth of brain-case, below, 1·4; orbits imperfect.

Head brownish grey, with more or less rust-colour; a line over and under the eye, a patch on each side of nose, cheeks, and chin pure white. From the white line over the eye runs a black line on each side over the crown and down the back of the neck; between these are two other longitudinal black lines, with an indistinct short one between them; the muzzle is spotted with black, surrounded by rusty chestnut, and an irregular line of the same runs from the posterior angle of the eye to under the ears, breaking into spots; another runs along the cheek, a third shorter one further down, and a fourth like a long spot on each side of the throat. Moustache-bristles brown and white. Ear pale in front, black behind, with a white spot. A black streak of grey marks each side of the hind neck. Underparts, inner surface of fore legs and of thighs, white, with large brownish-black oval spots. Upper parts brownish grey, washed between the shoulders, and less richly along the back, with chestnut-brown; shoulders spotted and marked with rich deep chestnut-brown, with streaks between them of the same colour mixed with black; further along the back the streaks break up into long oval or oblong black spots. The spots on the sides of the body and on the legs are browner. Fur short and somewhat soft; under-fur dusky grey. Fore feet light yellowish brown, speckled on the outer surface with chestnut; under foot dusky. Hind feet the same, without spots. Tail with longer and woollier hair than the body, more dully coloured, with large spots of dingy brown.

Head long and narrow, about 4·25 inches; ears short and angular, 1·6 long. Length of body 17, of tail 10·5. Fore leg about 9; hind leg about 9·7. Fore foot, from carpal joint, 2·8; greatest breadth 1·2. Hind foot, from tarsal joint, 4; greatest breadth 1·4.

The Formosan kitten, apparently about six weeks old, is similarly marked on the face, but has the spaces above the nose and under the eyes much richer chestnut. Its hair is longer and softer, of a dingy chestnut-brown, with the spots and marks fainter. Tail

thinner and less woolly than in the adult. Underparts white, with the spots also faint; legs more washed with chestnut.

41. VIVERRA ZIBETHA, Linn. (Indian Civet.)

Viverra zibetha, Gray, P. Z. S. 1864, p. 512.
V. ashtoni, Swinhoe, P. Z. S. 1864, p. 379.

Common in the bamboo-covered hills of South China, from Canton to near Shanghai, and in the Chusan Islands; occurs also in Hainan (see *antea*, p. 227). I have never detected it in Formosa.

42. VIVERRICULA MALACCENSIS, Gmelin. (Little Spotted Civet.)

Viverricula malaccensis, Gray, *l. c.* p. 513.
Viverra pallida, Gray; Swinhoe, P. Z. S. 1862, p. 7.

Common in South China, Hainan, and Formosa.

43. PAGUMA LARVATA. (Gem-faced Civet.)

Paguma larvata, Gray, P. Z. S. 1864, p. 359; Swinhoe, Zoologist, 1858, p. 6223; P. Z. S. 1864, p. 381.
P. larvata, var. *taivana*, P. Z. S. 1862, p. 8.

This tree-loving species is found in the hills of the Kwangtung and Fokien Provinces and in Formosa.

I kept one alive for some months in 1856, chained in my verandah at Amoy. It fed on cooked meat in preference to raw, and did not seem to care much for either fowl's eggs or small birds. A stuffed snake threw it at once on its guard, and with a spring it seized it by the head and shook it. A shrimp was offered to it; this it smelt, and then rubbed its head over, first one side and then the other, as dogs do over carrion; it refused to eat it. When let loose it used to climb up the doors and legs of tables and chairs, putting one foot on each side, and pushing up with the hind legs. It walked backwards and forwards at the length of its chain, shaking the lower jaw, and would suddenly stand up on its hind legs, giving utterance to a shaking cry. It snapped at all dogs, and kept them at a distance. It slept during a great part of the day, but continued lively for the greater part of the night. The heat affected it a good deal, and made it pant.

The Society's Gardens have two live specimens of this species received from Formosa.

44. URVA CANCRIVORA, Hodgs. (Crab-eating Mountain-mungoos.)

Urva cancrivora, Gray, P. Z. S. 1864, p. 568.

A specimen brought from the Fokien hills, near Amoy, agrees with Hodgson's specimens in the British Museum, from Nepaul.

Face long and pointed, with the nasal portion recurved; nose and upper lip with a deep vertical groove. Ears short, broad, and rounded. Soles of feet and underside of toes quite bare; claws strong. Fore foot:—first toe very short, second longer than the

fifth, the third and fourth subequal; a basal membrane attaches the second and third, and a membrane reaching to end of first joint the third and fourth. Hind foot: first toe diminutive, and placed well behind; third toe longer than the fourth, and united to it by a membrane to the first joint; second attached to the third, and fourth to the fifth, by short membranes. Head and feet clothed with short hair; rest of the body with long coarse and thick woolly under-fur; tail long and bushy, with long very coarse hair.

Nose and edge of lips brownish flesh-colour; iris deep brown. Hair of muzzle brown; upper lips, chin, throat, and a ridge of longish hairs extending from under the ears to the shoulder white. Head with light reddish-brown under-fur, the short hairs of the upper-fur being individually banded with black and white. Ear with short close-set whitey-brown hair, partly hidden by the hair of the cheeks. Upper parts of body with the under-fur brown at roots, buff above, the long hairs of the upper-fur having each a broad central black band and white tip, giving a hoary appearance to the coat; underparts with less black. Fore and hind legs blackish brown, sprinkled about humeral and femoral parts with buff specks. Tail buff white, with a few black-banded hairs intermingled.

Length from snout to root of tail 20 inches; tail 12, with an extra inch of hair at tip. Head 4·75; between ears 2. Palm to nail-tips 2·50; breadth of palm ·75. Sole to nail-tips 2·50; breadth of sole ·80.

This species has an extensive range in India, being found from Afghanistan through the Himalayas to Aracan; and we find it also occurring in South China.

No typical *Herpestes* seems to occur in China north of Hainan.

45. NYCTEREUTES PROCYONOIDES. (The Raccoon-like Wild Dog.)

Nyctereutes procyonoides, Gray, P. Z. S. 1868, p. 522.

Canis (*Nyctereutes*) *viverrinus*, Temm. Faun. Jap.; v. Schrenck, Amoorland, i. p. 63.

The "Raccoon or Civet Dog" ranges from Canton into Amoorland, and is also found in Japan. I have specimens of it from the Fokien hills, from Hankow, and from Shanghai; but I have not met with it in Formosa.

46. VULPES HOOLE, sp. nov. (South-China Fox.)

Vulpes vulgaris, Swinhoe, Zoologist, 1858, p. 6223.

The Fox of the plains and lower hills of South China is in form and size very similar to that of Europe; but it is paler, wants the black spot on the sides of the snout, and has the colours of its coat differently arranged. I have placed in the British Museum an adult female and two cubs; but as their skulls are within the skins, I have not been able to remark on them.

Throat, along upper lip, and under neck white, washed with black on chin, with dusky-grey under-fur. Moustache-bristles black.

Ear ochreous in front, black behind, with yellowish chestnut at base. Round eye and on space in front bright rufous. Rest of head light rufous, grizzled with white on the cheeks and crown. Upper parts dingy ochreous, with more or less rufous on the hind neck and shoulders, and brightening into chestnut on the back; deep rust-colour near the tail, grizzled with white, the white increasing on the sides of the buttocks; under-fur of the back dusky grey at base, rust-colour above. Tail rusty chestnut on the upper surface, with some of the hairs tipped with black; its sides and under surface light dingy buff, with the apical half of each hair black; its end with a conspicuous white tip. Anterior surface of fore legs blackish grizzled with white, outer sides rusty grizzled with yellowish, inner sides buff, under surface and hair between toes dingy brown. The white on the chest continuous downward in a line to the middle of the belly. Belly from behind fore legs, on each side of the white line, chestnut buff. Abdomen whitish buff, with a faint tinge of purple. Anterior surface of hind legs as of fore legs; their sides and under tarsi bright rusty chestnut.

Head 7 inches; neck to root of tail 19; tail 13·5, with 3 inches of hair projecting beyond. Length of ear 3. Length of fore foot, from carpal joint to tip of nails 3·76; of hind foot 5·5.

The cub about six weeks old is covered with thick downy hair, with a few long soft hairs intersprinkled. The rufous patch between the eye and nose is well marked. Upper lip and throat white, blackish on chin. Chest dingy white. Ear yellowish in front, black behind. Paws and toes blackish on upper surface. Crown and upper back dingy rust-colour; shoulders and sides of the body whitish. Tail light dingy, with a rufous wash on the upper surface. Underparts light dingy rust-colour, with a purplish wash.

This Fox is common on the bare granitic hills of Amoy; and I have seen as many as six together at a time. When pursued they spring with great agility from rock to rock, and soon outrun a Greyhound on such rough ground; but on the plains they are no match for the dog. They descend to the plains at night, and rob the hen-roosts. I have also seen them in Hongkong island. About Tientsin, in North China, Foxes are also common; but I have never handled a specimen from any northern locality. No Fox has been found in Formosa.

47. VULPES LINEIVENTER, sp. nov. (South-China Mountain-fox.)

Two Foxes were brought to me at Amoy in 1867, from the higher mountains of Fokien. They are very like the Black-bellied Fox of Europe, *V. vulgaris*, var. *melanogaster*, Bp.; but are remarkable for having a fine line of chestnut on each side of the belly. They are very brightly coloured, and so differ conspicuously from the last-described pale species, though in form and size very similar. Unfortunately the skulls were not saved.

Head grizzled with white and chestnut, round and under eye rich chestnut. A broad angular mark of brown from anterior corner of

eye to lip. Moustache- and face-bristles black. Snout, under level of nose, part of cheeks, and throat white. Throat, under neck, chest, and central underparts black, grizzled with white. Inside of ear well clothed and of a lively buff colour, which extends to the edges; back of ear brownish black. Upper parts buff, many of the hairs of the hind neck and shoulders being broadly tipped with black. Crown and hind neck washed with chestnut, which brightens as it runs down the back in a broad line. Under-fur greyish brown. Fore legs clothed with reddish-brown under-fur, and covered with black and white hair, with a broad deep black line running down their anterior surface to the feet; under carpus and feet fine brownish chestnut, brown on the hair about the palms. A bright chestnut-buff line runs down each side of the belly, from the fore leg to the hind leg, and narrows as it advances down inner side of hind leg, where it is flanked inwardly with a white line. Thighs grizzled with black, white, and chestnut. Tail bushy, bright chestnut on the upper surface, with many of the hairs broadly tipped with black; under surface much paler, with more black; tip white.

Snout to root of tail 32 inches; tail 17, with 2·75 length of hair beyond tip. Fore leg 11 inches, hind leg 12·5. Ear 2·75 long, 1·75 broad at base.

48. ? Otaria stelleri. (Steller's Sea-bear.)

Otaria stelleri, Temm. & Schleg. Faun. Japon.

I have been informed by the European pilots at Shanghai that they have often seen Seals basking on some islands called "the Ruggeds," at the mouth of the Yangtsze. I have not been so fortunate as to get a specimen; but it is not unlikely that they will turn out to be the same as the animal recorded from South Japan.

Rodentia.

49. Sciurus castaneoventris. (Chestnut-bellied Squirrel.)

Sciurus castaneoventris, Gray, Ann. N. H. ser. 3. xx. p. 283; Swinhoe, P. Z. S. *antea*, p. 231.

Sciurus erythræus, Swinhoe, P. Z. S. 1862, p. 11.

The Chestnut-bellied Squirrel is found in Hainan, the provinces of Kwangtung and Fokien, and in Formosa. The finest Formosan skins are rather larger, with longer tails, are bright deep chestnut on the underparts, and have broad buff tips to the hair of the apical half of the tail. The chin and chest in these is for the most part not red, but of one colour with the back. As in the Hainan and Chinese skins, the redness of the underparts is very variable in extent and intensity; and so is the yellowness of the tail. I have specimens from South Formosa of one colour throughout, and others with more or less red; and with a series before me I find it impossible to divide the animals from the different localities even into races. A fine specimen from North Formosa measures from snout to root of tail about 9 inches; its tail 9·5, including 2·5 inches of

hair beyond tip of tail-bone. *Sciurus lokriah*, Hodgs., *Sc. lokrioides*, Hodgs., and *Sc. erythrogaster*, Blyth, appear to be only three varieties of this Squirrel, the last very close to the Formosan. *Sc. erythræus*, Pall., has a fringed ear, and is distinct.

The British Museum has a red-throated Squirrel, marked from China. It is black on the upper parts and tail, chestnut on the underparts, fore legs, and hind feet, white on the sides and thighs. It differs somewhat from an animal also there from Borneo, but is so much in character with it that it is difficult to believe that it is really from China. Dr. J. E. Gray has described it as *Sciurus rufogularis*, in the Ann. & Mag. Nat. Hist. 1842.

50. SCIURUS GRISEIPECTUS. (Grey-breasted Squirrel.)

Sciurus griseipectus, Gray, Ann. & Mag. Nat. Hist. ser. 3. xx. p. 282.

China is given as the habitat of this plain-coloured species; but I have not had the good fortune to come across it in that country.

51. SCIURUS CHINENSIS. (Chinese Squirrel.)

Sciurus chinensis, Gray, Ann. N. H. ser. 3. xx. p. 282 (1867).

The Museum has two of this species from Shanghai, brought home by Mr. John Reeves. They are brown on the breast, upper parts, and tail; dusky white below, from chin to tail. Length of body about 7 inches, tail bushy and rather longer than the body.

On my journey from Ningpo to Shanghai, overland, I saw many of this species in groves of trees. It is arboreal in habits.

52. SCIURUS M'CLELLANDI. (M'Clelland's Squirrel.)

Sciurus m'clellandi, Horsfield, P. Z. S. 1839; Swinhoe, P. Z. S. 1862, p. 11.

This small striped Himalayan Squirrel, with tufted ears, is found in Hainan, the provinces of Kwangtung and Fokien, and in Formosa. M. A. Milne-Edwards assures me that he has also received it from Western Szechuen.

53. SCIUROPTERUS KALEËNSIS. (Small Formosan Flying Squirrel.)

Sciuropterus kaleënsis, Swinhoe, P. Z. S. 1862, p. 359.

Mountain-forests of North Formosa. I know no species of this form from South China.

54. PTEROMYS GRANDIS. (Large Red Flying Squirrel.)

Pteromys grandis, Swinhoe, P. Z. S. 1862, p. 358, pl. xlv.

Found in the north and central mountain-forests of Formosa. I have received it from various localities in the wilder parts of that island.

55. PTEROMYS PECTORALIS, sp. nov. (White-breasted Flying Squirrel.)

General colour a rich rufous; tail lighter, with brown at tip;

breast and streak down the centre of the belly white. Length from snout to root of tail 20 inches; tail 15, soft and bushy. The red fur of the body is sparsely sprinkled with white hairs. The fur is soft, moderately long, and much in character with that of *Pt. grandis*; in some lights it shows very brown.

A specimen of this fine species was brought to me at Takow, S.W. Formosa, in December 1865. It seems confined to the southern mountains of Formosa.

56. Mus bandicota, Bechstein (Linn. Trans. viii. t. 18). (The Bandicoot Rat.)

Mus nemorivagus, Hodgson.
M. setifer, Horsf. Zool. Res. in Java.

I have never observed the Bandicoot in China; but in Formosa, on the high road from Takow to the city of Taiwan, it was very abundant, living in holes at the foot of the hedges that line the way. I have not seen them in the towns. It would appear likely that this Rat was introduced into Formosa when the Dutch were in possession, in A.D. 1630.

I have the skin and skull of an adult from Formosa; the former measures from snout to root of tail 11·5 inches, tail 6·75; ear 1·1 in length. The skull agrees with specimens from India.

57. Mus decumanus, Pall. (Commercial Rat.)

Mus decumanus, Swinhoe, P. Z. S. 1864, p. 382.

Abundant in all large towns in South China and Formosa.

The white and pied varieties of *Mus rattus*, L., are to be seen in cages in the towns; but these are imported.

58. Mus indicus, Geoffroy. (Indian Rat.)

Arvicola indica, Gray; Hardwicke, Ill. Ind. Zool. i. t. 11.

My largest specimen from Formosa is 10·75 in length, tail imperfect, ear ·66. A smaller one, length 7, tail 5·25. Colour above light chestnut-brown; most of the hairs broadly tipped with black, giving in the adult a streaky appearance to the back. Long fine moustaches on muzzle white, short ones black. Sides of muzzle, feet, and underparts dingy white, with a tinge of yellow. Tail sparsely covered with short spinous bristles, brown on the upper, white on the under surface of the tail.

In the city of Taiwan, Formosa, this large Rat was nearly as common as the Commercial Rat, and seemed to associate with it. I have not noticed it in the towns of the Chinese main.

59. Mus alexandrinus, Geoffroy. (South-European Rat.)

Adult male measures 8·6, tail 6, ear ·7. This species is a good deal like the ordinary grey Rat, but has longer and richer-coloured pile, the ear is larger and more oval, the feet smaller, and the tail proportionately longer, and with much more short hair, especially near the tip. Upper parts dark yellowish brown, with many of the

hairs on the back and rump broadly tipped with black. Underparts dingy, tinged with ochreous. Moustache-hairs long, fine, and dark. Identified by Dr. Peters.

This Rat is found in country villages and outplaces about Amoy, and would seem to be an earlier introduction than the *M. decumanus*, from the face of which it has probably retired. The latter is the only species one sees in the town. It is difficult now to discover what were the House-rats of China before the introduction of the three last-named species. In villages and country towns, where the latter have not established a footing, Country-rats, which often scale trees, are found entering houses and running about the streets. In Formosa, where the Commercial Rats are not so widely extended, several species of these Country-rats occur; but in China I have as yet only noticed the *M. rufescens*.

60. Mus coxinga. (Spinous Country-rat.)

Mus coxinga, Swinhoe (errore *coninga*), P. Z. S. 1864, pp. 185, 382.

Most numerous in the north of Formosa, less so in the south-west. I have not heard of it in China. Does not appear to enter large towns, but is found abundant in villages of the interior, to which the bigger Rats have not reached.

61. Mus rufescens, Gray. (Chestnut Country-rat.)

Mus flavescens, Elliot.

This species was determined by Dr. J. E. Gray from specimens I brought home in 1862. It used to occur in the gardens at Amoy, and I have several times seen it running up and down trees in the daytime. I jotted down the following note on a specimen I shot at Amoy on the 17th May 1859:—Length of body 4·3; tail 3·8; head 1·5; ear ·7, large and oval. Fur short and soft, with a few long soft hairs interspersed. Moustache formed of long, delicate, black and white hairs. Upper parts pale reddish brown, ochreous about the head; underparts whitish; all the under-fur slaty grey. Tail scaled as usual, and set with many short pointed setæ.

This Rat is found also in many parts of India. I have not noticed it in Formosa.

62. Mus canna, sp. nov. (Silken Country-rat.)

Mus ——?, Swinhoe, P. Z. S. 1864, p. 382. no. 26.

♂. Length 5·5; tail 5·25; ear bare, ·6 high, oblong, rounded at tip. Hind foot from tarsal joint 1·4. Hair short, soft, and mouse-like. Front teeth narrow and slender, with orange surface. Upper parts and legs brown, tinged with light chestnut, more conspicuous on the head and along the sides; underparts dingy ochreous; tail light brown, nearly naked, with minute inconspicuous setæ. Under-fur light slaty. It resembles the immature of *M. indicus*, but has smaller feet, and a soft silky pelage.

A Rat affecting villages in the country near Tamsuy, Formosa, and ascending trees.

63. Mus losea, sp. nov. (Brown Country-rat.)

♂. Length 6 inches, tail 3·75. Teeth broader than in the last, and of the same colour. General colour of upper parts a rich brown, many of the hairs of the head and upper parts tipped with black, giving a dark appearance in some lights; fur soft and moderately long; under-fur dark slate-grey. Underparts dingy whitish; legs brown, with a streak of whitish on each edge of fore foot. Ears moderate, naked. Moustache rather short. Tail brown, with minute black setæ scarcely visible.

This is also a Country-rat at Tamsuy, Formosa.

64. Mus ningpoënsis, sp. nov. (Short-eared Field-mouse.)

Length 3·25; tail 2·75. Lower incisors longo-triangular. Ear ·35, with short hair. Upper coat rich chestnut-brown, with deep slate-coloured under-fur; lower parts and feet white. Moustache-bristles short and very fine. Fore foot minute; hind foot ·7 from tarsal joint. Tail light brown above, whitish below, with minute scattered white hairs.

This little creature I picked up at Ningpo, in the consulate garden. It is a field-mouse; and "is," says Dr. Peters of Berlin, "nearly related to the European short-eared mice, *M. agrarius* and *M. minutus*, being larger than the latter, and without the dark dorsal streak of the former."

65. ? Mus badius, Hodgson. (Long-tailed Field-mouse.)

Mus ——?, Swinhoe, P. Z. S. 1864, p. 382. no. 27.

This long-tailed Field-mouse, with chestnut upper and whitish underparts, allied to *M. sylvaticus*, L., of Europe, appears to have a wide range in China, if I am right in identifying the one I got at Tamsuy with that I saw in Hainan. Unfortunately both the specimens I picked up were too mangled to preserve. I have therefore not been able to identify it.

66. Mus argenteus, T. & S. Faun. Japon. (Yellow House-mouse.)

Mr. S. Bligh, at Canton, gave me a small fawn-coloured mouse, with light under parts and rather long tail, which answers well to the species described in the 'Fauna Japonica.' I have not seen it from other parts of China.

67. Mus musculus, L. (Common House-mouse.)

Mus musculus, Swinhoe, P. Z. S. 1864, p. 382.

Occasionally seen in houses both in South China and Formosa; probably introduced. Black and white varieties are often kept by the Chinese; these are brought from the Straits.

68. Rhizomys chinensis. (Chinese Bamboo-rat.)

Rhizomys chinensis, Gray, P. Z. S. 1831, p. 95; Ill. Ind. Zool. t.

This large Bamboo-rat was procured by Mr. John Reeves at Canton. I have not heard of it from other parts of South China.

69. HYSTRIX SUBCRISTATA, sp. nov. (Subcrested Porcupine.)

Hystrix, sp., Swinhoe, P. Z. S. 1864, p. 378.

I had often heard of a Porcupine occurring both at Swatow (province Kwangtung) and at Foochow (province Fokien), and knew that it was an animal well known to the Chinese as the "Bristly Pig" (Court dialect, *Haochoo*; Amoy, *Ho-te*); but it was not till May 1867 that I procured specimens. One of these was brought to me alive, and I shipped it for the Society; but it got overfed by the passengers, and died before the vessel left the port. The other specimen, a skin with skull, I have brought home. The skull is very similar in form to the two of *H. hodgsoni*, Gray, in the British Museum, and is like in form of teeth. It is the skull of an old animal, whereas the Museum specimens have open sutures, and show juvenility. It is larger, and exhibits differences of detail; but it is questionable whether these may not be attributable to advanced age. Judging from the skull alone, one might be inclined to identify our animal with the Nepaul species; but the external form of the Chinese Porcupine displays a conspicuous occipital crest, which is entirely absent in the other. Hodgson and other zoologists lay great stress on the want of this crest (see Waterhouse, Mammalia, iii. 461); and the mounted skins in the Museum, both more than two-thirds the size of my specimens, bear no trace of it. My specimens, on the contrary, differing in age, *inter se*, have each a crest. I follow, therefore, Dr. J. E. Gray's advice, and separate the Chinese animal from its Nepaulese ally, though the question as to its distinctness will not be satisfactorily determined until we ascertain either that the Himalayan Porcupine has the crest when fully adult, or that the Chinese Porcupine is destitute of it in its younger state.

The following is a description from the living animal, corrected by help of the skin:—

Snout to root of tail about 28 inches; tail about 5, covered at its base by the protruding quills of the rump, and carrying a bunch of short white truncated quills on pedicles on the apical third of its length. Palm to end of nails 3 inches; sole to end of nails 4. Head brown, with rather bare brownish flesh-coloured cheeks. Iris deep brown. A few short scattered hairs round eyes. Ears oval, flesh-brown, sparsely covered with whitish hairs. Nose deep brown. Muzzle and lips with short brown hairs. General colour light purplish black, much deeper on the legs; white on the long hairs of hind neck, with a crescent-shaped mark of the same colour across breast. Head, legs, and belly clothed with short stiff bristles; neck, anterior half of back, and sides with short furrowed black spines from 1 to 3 or more inches long, ending in sharp points, thicker on the back, and tipped with yellowish. From the occiput spring long stiff black bristles, white on the apical half; and along the hind neck runs a bushy ridge of the same from 2 to 5 inches long, black, with more or less white. Hind part of back with long, thick, rigid quills, the longest about 9 inches, mostly white at base, with more or less white at tip; their central portions black, without

the usual white rings; interspersed among these are a few long thin quills, chiefly white, and reaching a foot or more in length. Skin below the quills flesh-white, sprinkled with scattered tawny hairs, which occur amongst the bristles as well. Footpads brown; claws brownish horn-colour.

The Porcupine occurs in Hainan (see *antea*, p. 233), but in Formosa I have never detected it. The Taiwanfoo Gazetteer (a Chinese work), however, includes it in its list of the natural productions of that island. It describes it as "covered with arrows like the quills of the Hedgehog, which make a rustling noise when the creature walks. These arrows it can dart at people, but not to a greater distance than from eight to ten feet."

70. LEPUS SINENSIS. (Chinese Hare.)

Lepus sinensis, Gray, Hardwicke's Ill. Ind. Zool.; Swinhoe, P. Z. S. 1862, p. 359.

This small, coarse-haired little Hare is the only species in Formosa and South China. It is yellowish brown on the upper parts, the hairs being broadly tipped with black; a little white occurs above and behind the eye. Ears about the length of the head, with a light buff rim, and a blackish-brown apical spot on the hinder surface; a patch of light rust-colour on the hind neck; legs and flanks a lighter shade of the same; belly and inside of thighs yellowish white; tail brown on the upper surface, with a few black hairs intermingled; its under surface light buff; under-fur of coloured parts light slate-colour.

Hainan possesses a Hare of its own, my *L. hainanus* (see *antea*, p. 233, Pl. XVIII.), and North China the *L. tolai*, Pall., in company with the species under notice.

UNGULATA.

71. SUS LEUCOMYSTAX. (White-moustached Boar.)

Sus leucomystax, Temm. & Schleg.

In February 1869, Mr. Ludlam, an American gentleman at Shanghai, shot in the neighbourhood of that settlement two large wild Boars, and very kindly allowed me to take the skin and skull of one of them. This animal measured between five and six feet, and had a thin tail about ten inches in length; length of skull 18; ear 3·75 in height. The upper parts of its skin are clothed with coarse black bristles, broadly tipped with light yellowish brown, and from 4 to 5 inches in length, longest on occiput and along the back; the under-fur is yellowish brown, and like tow. Cheeks, under parts, and legs black; abdomen, between thighs, anal region, and tail dingy white, the latter with a black tuft at tip. The moustache-mark is formed by broad whitish tips to the black bristles of face. Ear small and pointed, with white-tipped black bristles inside and on anterior surface, behind with black bristles, on the upper half forming a low fringe, bare at base and on the portion of the head where the ear rests. The under-fur on the lower parts is short and scanty. Nose sprinkled with a few short stiff hairs. The face is

black, with the exception of the moustache-mark; the top of the head and upper parts show light yellowish brown, and the under-parts black.

Fig. 1.



Head of *Sus leucomystax*.

Fig. 2.



Molar series of *Sus leucomystax*.

The want of warts on the face, the small ear, and the absence of a beard distinguish this animal at once from *Sus scrofa*, L.; the want of a crest and beard and the black hoofs from *Sus indicus*, Schinz, of India.

This Pig is now abundant, and to be found of fully developed size, in a country where, before the devastations of the Taiping rebels, the land was highly cultivated and not a wild pig was known. The natives declare that they are merely the descendants of the pigs of their farmsteads, which were abandoned and ran wild.

The skin and skull from Shanghai I have brought home; and Dr. Günther was so kind as to help me to compare the latter with skulls of *Sus scrofa*, L., of Europe, and *S. indicus*, Schinz, of India,

in the British Museum. *Sus scrofa* was at once distinguished by its nasal bones exceeding the head in length, and by the comparative greater distance of the palatal notch from the bulla. The Shanghai and Indian skulls, all of nearly equal size and age, were then carefully compared; and, with the exception of a rather more convex vertex in the former, there was no appreciable difference. Dr. Günther gave it as his opinion that, judging from the skulls, he would consider the Shanghai and Indian animals to be of the same species.

The authors of the 'Fauna Japonica' consider the *Sus leucomystax* of Japan the stock of the Japanese domestic Pig, from the resemblance of the two. The figure given in that work bears a strong likeness to our Shanghai animal; but the description of the species is too scanty for certain determination.

72. Sus taivanus. (Formosan Wild Boar).

Sus taivanus, Swinhoe, P. Z. S. 1864, p. 383; Gray, P. Z. S. 1868, p. 26.

Porcula taivana, Swinhoe, P. Z. S. 1862, p. 360.

From the last, or what we take to be *Sus leucomystax*, the distinction of the Formosan animal is apparent both in skin and skull. I have the skin and skull of one animal about two-thirds grown from Tamsuy (N.W. Formosa), and a large series of the skulls of adults procured in the central mountains of the island from the native Indians, who use them to ornament their shrines. These skulls average in length a foot; and in many the disappearance of sutures and the full development of teeth prove maturity, and show that the Formosan animal does not attain the great bulk of the larger species. Dr. Günther kindly assisted me in comparing the skulls. In general characters they are allied to those of *Sus indicus*, but the crown of the head, or space between the orbits, is on the whole flatter than in the latter; and, with the exception of the last molar, the molars (including the premolars) are comparatively larger—indeed, so much so that their united length (though the skulls are greatly smaller, as 12 to 17) about equals that of the same in the other. Their tusks are comparatively smaller and weaker. The females, as a rule, have the vertex much broader than the males; but its breadth varies greatly in both sexes.

The chief difference in its external form appears to be in the shape of the ear, which is broad, rounded on the edge, and drawn to a point in the present species. The accompanying figures (1 and 3) will illustrate this.

In the 'Proceedings' of this Society for 1862, p. 360, and for 1864, p. 383, I have already described the appearance of this species when only a few weeks old, and when some months old. I will now describe the animal about two-thirds grown that I procured at Tamsuy.

Length 3 feet, of tail 4 inches, of skull 10; height at shoulders about 21 inches; ear 2·5 long, 1·75 broad. Body sparsely covered with light yellowish-brown hair, intermingled with black bristles, which are longer, coarser, and more conspicuous. Ear short and broad, produced to an apex, with some yellowish hair inside and on

anterior surface, and a few blackish hairs behind, the base of the hind part being naked, and no hairs overlapping on its upper edge to form a fringe. From the occiput along the back to beyond its centre runs a ridge of bristles about 3 inches long, for the most part

Fig. 3.



Head of *Sus taivanus*.

Fig. 4.



Molar series of *Sus taivanus*.

black, forming a dorsal mane. Moustache-streak scarcely visible; in the advanced stage of the youngling this is white and conspicuous; but the moustache-streak is no specific character, as many species of Pigs have it more or less. Tail dressed with a few whitish hairs, with long black bristles at its tip. Hoofs brownish black.

The Taiwanfoo Gazetteer speaks of a much larger Pig inhabiting the island than the wild species appears to be. But, as in many other animals he speaks of, the Chinese author either brings his notions from China, or spices his history with exaggeration. He says, "the Yay-che (or Wild Pig) has the ears and tail rather small; its hair is bristly and of a brown colour; and it differs somewhat from the domestic Pig. *The largest are as big as a cow* (meaning, however, a small Chinese Cow) with *enormous* tusks projecting beyond the lips. It gashes trees and can break them down. Its

strength can oppose the Tiger. When enraged it will wound people with its tusks, abruptly breaking their ribs or goring their bellies. It rushes on its object like the wind. Hunters dare not shoot them."

The Chinese colonists have introduced their black hollow-backed breed of Pigs from South China; and among the villages of the plains you see none but these. At Takow a European imported a large white English tame boar, and it was allowed freely to cross with the Chinese Pigs; and an improved piebald breed has been the result, and has shown itself perfectly fertile when crossed with the sire, with one another, and with the Chinese Pig.

In Ogilby's 'Atlas Chinensis,' ii. p. 8, we read that on the arrival of the Dutch in Formosa in the early part of the seventeenth century, when the Chinese were just beginning to colonize, every aboriginal "woman had commonly a great Pig running after her, as we use to have a Dog." Thus before the islanders had intercourse with the outer world they had a Pig of their own, which is still found among the tribes of the central mountains. These are curious animals, of a chestnut-red colour throughout; but I have occasionally seen examples patched with white. The young of this breed are also red, the skin and all the soft and horny parts being stained with more or less of the prevailing colour. From the form of this Pig and the small size and shape of its ear, I should think that it is doubtless derived from the wild stock of the island. The traditions of the natives confirm this impression; and the Pig was the only domestic animal they were found to possess when the island first came under European observation. But why should domestication have changed the animal to a red colour instead of to black and white, the usual colours that first develope under its influence? As a rule animals in their variability have a less tendency to erythrism than to either albinism or melanism; but domestication in this species has inaugurated change by developing the first in preference to the other two. The reason why, I cannot divine. I have found this red Pig cross readily with the Chinese black Pig; and the young in such cases appeared with indications of the stripes of the young wild Pig. But this I take to be due to the intermingling of the colours of the parents, and would probably have been carried into maturity had the offspring lived. My time was unfortunately too short to continue experiments of this kind; so I sent several of the red Pigs to England in the hope that somebody at home would take the matter in hand. But my specimens were not hailed with a welcome.

From the savages of the east coast of Formosa I received a pair of Pigs, black, white, and red, with moderate-sized ears, long face, and long bristles on the upper parts. These looked very like a cross between the red Pig and a domestic English Pig; and it is not impossible that some ship may have supplied to the natives on that coast the progenitors on the one side. The skull, however, of this Pig shows no great difference from that of the wild stock of the island, except in having a more prominent forehead and in the greater length of the bones of the face.

Whilst at Amoy I received from Chefoo (North China) a strange variety of tame Pig, with a piebald woolly coat, the young of which

called to mind some breeds of Rabbits. This Pig also bred freely with the red Pig, the offspring partaking of the characters of both parents.

RUMINANTIA.

73. HYDROPOTES INERMIS. (Hornless River-deer.)

Hydropotes inermis, Swinhoe, P. Z. S. 1870, p. 89, Pls. VI. & VII.

This is the hornless so-called Hog-deer that resorts to the islands of the Yangtsze near Chinkiang, and is sold for venison in the Shanghai market. I have not noted its occurrence elsewhere in China. M. Alphonse M.-Edwards has pointed out to me that in the shape of its skull and form of teeth this animal approaches the fossil *Dremotherium feigneuxi*, Geoffroy, from the Miocene of France.

Hainan produces a Mouse-deer, which I have made out to be the *Tragulus meminna*.

74. CERVULUS REEVESI. (Reeves's Muntjac.)

Cervulus reevesi, Ogilby, P. Z. S. 1838, p. 105; Swinhoe, P. Z. S. 1862, p. 361.

Found from Canton to Ningpo and in Formosa. In Hainan it is replaced by the allied Indian form, *C. vaginalis* (Bodd.).

75. CERVUS PSEUDAXIS, Eydoux & Souleyet. (The Formosan Spotted Deer.)

Cervus taivanus, Blyth, J. A. S. xxxix. p. 90; Sclater, P. Z. S. 1860, p. 376, et 1862, p. 152, pl. xvi.; Swinhoe, P. Z. S. 1862, p. 362.

In the 'Transactions' of the China Branch of the Asiatic Society at Hongkong for 1847, the President (Dr. Bowring) is reported to have said (p. xix) as follows:—"Keying sent me from Canton an adult male and female and a fawn of what I had hoped, before they arrived, might turn out a new species of Deer; but they proved to be identical with the Fallow Deer which we have at home." This led me to suppose (P. Z. S. 1864, p. 169) that the *C. dama*, L., was also an inhabitant of China; but I have since visited the Viceroy's gardens at Canton, where some of the Deer still remain, and find that all in those grounds belong to the Formosan species, and have been bred from individuals introduced from the island. I was also misinformed as to the occurrence of *Cervus axis* in China. The animals of this species in Messrs. Jardine, Matheson, & Co.'s gardens in Hongkong (P. Z. S. 1864, p. 169) were brought from India, and not from Hankow. In Hainan the *Panolia frontalis* (Hodgson) (*Cervus eldi*, Guthrie) is found; but I have not heard of any species of spotted Deer occurring in China south of the river Yangtsze. The *C. pseudaxis* is restricted to Formosa; North China produces a larger allied species (the *C. mantchuricus*, mihi), and Japan a smaller form (the *C. sika*, Temm. & Schleg.).

The Formosan species has now for some years been a constant inhabitant of the Society's Gardens, and has bred. Its development and change of coat have been observed and will shortly be illustrated by figures in the very excellent paper that Dr. Sclater has given to

the 'Transactions.' I have only a few notes to offer on the appearance of some skins that were brought to me at Takow. One was a stuffed skin of a fawn about 19 inches in length. Its colour was rich yellowish brown, deeper on the back, and paling on the sides and legs; face redder, with a blackish-brown forehead, and dark brown behind the ears. Inside of ears, underparts, inner sides of legs, and under tail pure white, the throat and neck above being tinged with red; upper surface of tail red. Two rows of yellowish spots flank the back on either side, with a few irregular ones outlying on the shoulders and hind quarters.

Three skins of adult animals are in different stages of coat:—the winter, when the hair is brown finely mottled, the list down the back showing itself in a deep brown line becoming black over the tail, the underparts a dull white; hair not long and spots scarcely visible. The autumn dress, evidently of a young male from its shagginess and coarseness; the list down the back much blacker, the brown tinged with a rich red, and the white spots beginning to fade. The third skin shows the appearance of the female in summer—of a rich orange-buff, browner on the back, with a deep black dorsal ridge, the white spots pure and conspicuous with a wavy white line of coalescing spots below from fore to hind leg, under which the buff again appears, but very pale, and is succeeded by the white of the underparts. In all three skins the upper surface of the tail and the rump at its base are black, the lower surface of the tail and the inner side of buttocks pure white.

The following Chinese notice on the Formosan Deer from the Taiwanfoo Gazetteer is perhaps worth recording:—"The Formosan hills have no Tigers; hence Deer are very numerous. In former years the whole island was given up to hunting-ground by the aborigines; now it is ploughed and sown by the Chinese settlers, so that fair fields extend as far as the eye can reach, and the Deer have betaken themselves to the mountains. They are there hunted and captured; but the horns of the Formosan species are thin and soft at the base, and not equal to the plump branchers from Leaotung Province (North China). A hundred pairs when roasted will only produce about twenty pounds of medicinal glue. Though Deer abound, you may seek a piece of venison in vain in the markets. At the winter and spring festivities, however, the natives cut venison up into square blocks weighing over a pound each, and, after steeping them in brine, forward them to the departmental and district cities. The colour of the vension so preserved is black, and its taste changed; it is not fit to pick up with chop-sticks; and yet its price is no trifle.

"Deer by their horns record their years, each fork on the antler signifying one year, much as the age of horses is recorded by their teeth. The aborigines shoot Deer for food; but no one has ever met a buck carrying seven or more forks on the antlers. It was declared in former days that Deer were fairy animals of great longevity; and it was stated that at the age of 500 they were white, and at 1000 black. But these stories must be fables; for the natives at Chuhtsan shot a small Deer of a pure white with only two forks to its antler. This albinism cannot, therefore, be otherwise than due to an accidental

variation in the colour of the hair. Three years after birth the Deer commences to horn. At the end of the year the horns drop away as do the milk-teeth of infants. Other horns appear in their place, which are retained throughout the animal's lifetime; but every year an extra fork is added.

"The teats appear in the doe at the age of four months. Just before they show she gets extremely fat. When big with young, her skin is soft, smooth, spotted, glossy, and very lovely. As soon as the doe has finished suckling and observes her fawn getting to maturity, she deserts it and repairs to other hills, fearing that her own issue might entertain an improper affection for herself. Animals do not confuse the ties of consanguinity, the horse excepted. The stallion, however, when he does commit incest with his mother, soon after dies. The doe deprives her offspring of the opportunity by setting a distance between herself and fawn; for she deserts it and betakes herself afar."

I have lately examined the type specimens in the Paris Museum of *Cervus pseudaxis*, and I am convinced that they belong to the Formosan species.

76. CERVUS (RUSA) SWINHOII. (Swinhoe's Deer.)

Cervus (*Rusa*) *swinhoii*, Sclater, P. Z. S. 1862, p. 152, pl. xvii.; Swinhoe, P. Z. S. 1862, p. 364.

In the central ranges of Formosa near Mount Morrison this brown deer is very common; and on a visit I paid to the wild tribes of these parts in February 1866 I found them hunting the Deer with dogs*. A place is cleared in the forest, where a party of men hide armed with matchlocks; the dogs yelp after the deer and drive them into the open, where the hidden sportsmen get easy shots at them. The son of the chief with whom I was staying had just returned from a successful battue with the robust antlers and flesh of a large buck. I induced him to return for the head, which he had thrown away on the field. I was thus enabled to secure a fine skull for the British Museum.

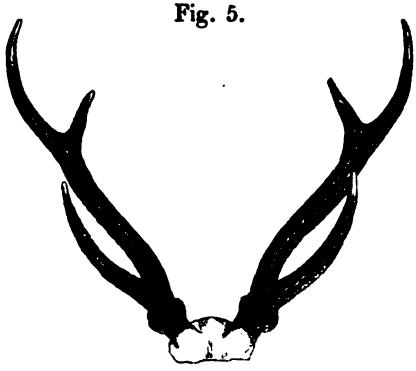
The young of this species about half-grown is reddish brown, with the tail bushy and black, but reddish at its root. Sides of the body paler, and the belly blackish brown. Legs pale towards the hoofs; the latter black. Under surface of tail, abdomen, and inner sides of hind legs down to middle of shank yellowish white, the breast and belly being blackish brown. Under surface of head and neck mottled whitey brown. Crown of the head with many of the hairs tipped with black; from the occiput a dark line runs down to the base of the tail. Ears blackish brown, tipped and margined with ochreous white, and whitish on their insides.

The adult, in summer, has its coarse hair deep brown, faintly mottled, rufous on the rump; between the fore legs and the thighs ochreous white; tail bushy and dark. In winter it becomes a deeper brown. The Society's Gardens have had two or three examples of

* The Dogs in the possession of these aborigines were of the ordinary Chinese breed procured from the colonists.

this animal alive; and Dr. Sclater is doing it justice in his paper for the 'Transactions.' Fig. 5 represents the antlers of a mature individual which I procured in South Formosa.

Fig. 5.



Cervus swinhoii.

I have not heard of any species of *Rusa* occurring on the main of China; but in Hainan the *C. hippelaphus* appears to abound. From North China we have the *Cervus xanthopygus*, A. M.-Edwards, the *Elaphurus davidianus*, A. M.-Edwards, and the *Capreolus pygargus* (Pall.).

77. CAPRICORNIS SWINHOII. (Swinhoe's Goat-antelope.)

Capricornis swinhoii, Gray, Ann. & Mag. Nat. Hist. ser. 3, vol. x. p. 320; P. Z. S. 1862, p. 263, pl. xxxv.; Swinhoe, P. Z. S. 1862, p. 361.

Found throughout the hilly ranges of Formosa.

The young have the ears white on their anterior surface or, sometimes, more or less white throughout. The region of the lips is whitish; and the chin and throat light buff, with a brown spot on the former. The abdomen and between thighs are also light buff, and the feet lighter red. The hair of the body is shorter; they are otherwise like the adult.

The adult is of a deep brown throughout, tinged with red. The crown and a line down the back deep brown. Lips whitish. Chin and throat chestnut, with a brown patch on the former. Ears light buff inside, reddish brown behind. Abdomen brownish buff. Feet deep chestnut; hoofs black. Hair about 1·5 inch long, thick-set, harsh, and a little wavy. It does not acquire horns till it is nearly full-grown.

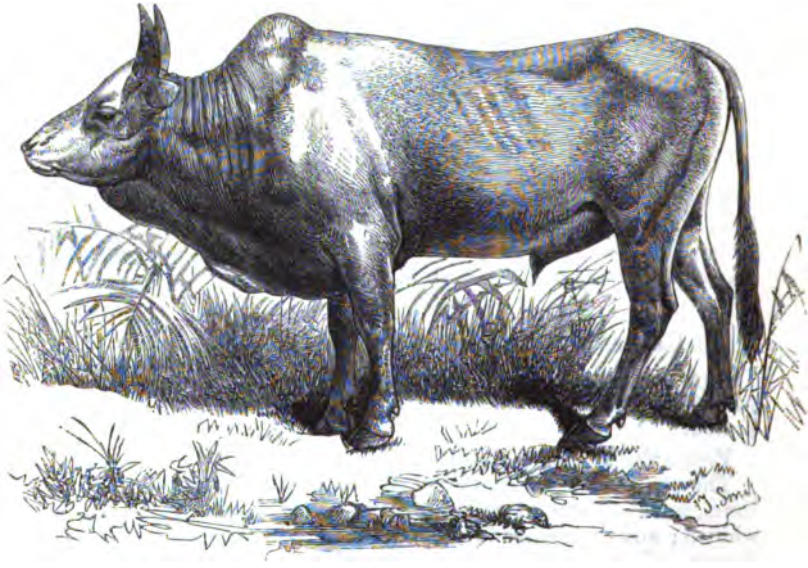
The nearest ally to this curious Antelope appears to be the *Capricornis sumatrensis*, of which there is a specimen in the British Museum.

Capricornis crispus (T. & S.) of Japan appears to have greater affinity with the newly described *C. caudatus*, A. M.-Edwards, from Peking.

78. Bos chinensis. (South-China Cattle.)

The small Yellow Cow of South China is a peculiar race, combining, as it seems to do, the characters of *Bos indicus* of India and *Bos taurus* of Europe. It has the head and dewlap in character with the former, with a small hump, the straight back, and hind quarters of the latter. Mr. Blyth maintains that it is a cross between the two; and this opinion may perhaps be borne out by the fact that the North-Chinese large cattle are certainly like our European ordinary breed. In the 'Taiwanfoo Gazetteer' I read this passage under the head "Yellow Cow":—"The neighbouring hills have this animal in

Fig. 6.



Bos chinensis.

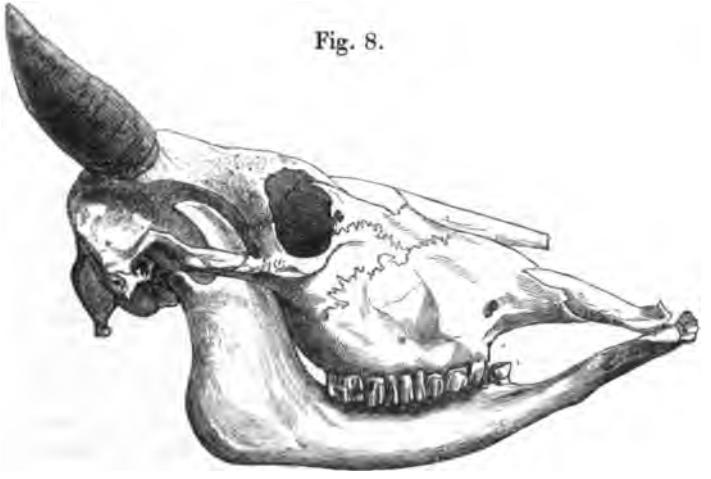
abundance. They are caught and tamed, and are trained for use in the ploughing of fields and drawing of carts;" and further on, "Formosa has an abundance of wild cattle, occurring in herds of hundreds and thousands. When it is desired to capture them, a wooden stockade is erected with four sides, in one of which is left a door. The cattle are driven towards it until they all enter, when the gate is shut on them and they are barred in and left to starve. They are afterwards by degrees haltered and bridled, and treated to fodder and beans, until they become not different from domestic cattle." Were these wild cattle indigenous to the island, or were they simply feral descendants of an introduced race? If the latter, who introduced them? The Chinese, when they commenced to settle in Formosa, found enormous wild herds already there. The

Fig. 7.



Top view of skull of *Bos chinensis*.

Fig. 8.



Side view of skull of *Bos chinensis*.

wild natives did not use them except for food; and it is not likely that they could have conveyed domestic cattle in the small canoes by which they straggled to Formosa. If they had, we should expect to find some peculiar breed, whereas, as our author tells us, they "were not different from (South-China) domestic cattle." To show that they were derived from the Chinese breed, we should have to believe that the Chinese had earlier communication with the island than their records declare. I take it, then, that the wild Formosan Cow was indigenous to Formosa, and of the same species that ranged throughout South China, from which the present domestic cattle of the south are derived. I have not heard of its being found wild in the present day in China; and in Formosa the wild race has almost, if not quite, disappeared. In the central mountains they are kept in a semi-wild state, and from there I procured the skulls of an adult male and female and a live bull. The bull I had photographed and now exhibit its portrait (fig. 6, p. 648); and the skulls are deposited in the British Museum. The figure shows a better and stronger build than ordinary South-China Cattle possess, and proves the two to be of the same race. The Chinese have done little to improve their breed of cattle; and you may see this kind in the country from Canton to Ningpo unchanged in form or shape of horns, but, as a rule, a little smaller and more degenerate than the wilder animals from the Formosan mountains. The skull of the bull (figs. 7 & 8) measures 19·5 inches in length; the horns are somewhat conical, measure 8 inches in length each, and stand outwards and backwards. The animal is a rich chestnut-brown with whitish underparts and feet. Its horns and hoofs are black.

I have never heard of the Buffalo occurring wild in either China or Formosa. The domestic variety, used as a beast of burden by the Chinese, is short-horned and apparently the same breed as that found in Manilla.

Edentata.

79. Manis dalmanni, Sundevall. (Scaly Ant-eater.)

Manis (*Pholidotus*) *dalmanni*, Gray, P. Z. S. 1865, p. 366; Swinhoe, Zoologist, 1858, p. 6224; P. Z. S. 1864, p. 381.

In June 1867, at Amoy, I purchased a family of Scaly Anteaters, consisting of the mother and father and three little ones. The old ones had dim watery eyes and were rather slow in their movements, walking on the sides of the hind feet and on the tips of the claws of the fore feet. The young were brighter-eyed and active, running about the room in all directions, standing on their hind legs and assuming a variety of curious positions; but their habit of walking was essentially the same as in the adults. I kept them all alive for some days; but I never heard them utter any cry, not even a moan.

The adult male measured in entire length 33·25 inches; tail 13·5; tip of nose to upper corner of ear 3·1; height of ear 1·1; across head from ear to ear 2; anterior corner of eye to tip of nose 1·9; breadth of eye ·5; breadth of gape ·9, of muzzle ·7, of nose ·5; length of sole of hind foot 2·4, greatest breadth 1·4; length of middle claw of fore foot 2·1.

Head, ears, the under and all fleshy parts milk-white, or the colour of cooked pork, the nose and muzzle having a tinge of purple. Cheeks, throat, and underparts sprinkled with shortish stiff coarse hairs of a light reddish sandy colour. A few lighter-coloured bristles project from under the vertex of each scale from the occiput to the tail. Scales short and broad, and usually purplish brown for two-thirds of their length, the tip portion yellowish-grey horn-colour. On the sides of the body, and especially along the legs, the scales are placed far apart, exposing the white skin. The small scales on the sides of the fore legs are often sunk beneath the level of the bulging skin. Besides the basal vertical striæ on the scales, there are often (on the large scales chiefly) two or three transverse furrows near their bases. The large scales are held to the skin by a fleshy nipple-like pimple on each side of them adhering to their basal angles. Claws dingy yellowish.

A young male measured 21·75 in entire length; tail 8·75. Head comparatively shorter and deeper than in the adult. Face pinkish white, washed about the muzzle and borders of ears with blackish grey; nose and lips purplish grey. Tongue about 2·75 long, ·45 broad, narrowing to ·2, and rounded at tip; composed of a vermiform centre with fleshy side-rims, gradually flattening towards tip. Bare parts milky white. Reddish sandy hairs occur about the lower lobe of the ear (which is shaped something like the human ear), the throat, and underparts; in the first two longer and more numerous than in the adult. Longer and coarser whitey-brown hairs spring in tufts of five or so from under each scale. Scales more uniform and compact, even on the legs, than in the adult, more striated longitudinally and transversely, and much darker in colour, resembling the side-pieces of an acorn-barnacle (*Balanus*). Many of the lateral scales of the neck, body, and legs carinated; general colour of scales glossy blackish brown with a tinge of sea-green, sometimes tipped, edged, and marked along the keels with light horn-colour. The basal pimples that support the scales of the adult are not apparent in the young animal.

The three young ones differed in size and in the proportional length of their tails, and, I do not think, were of the same birth. Only one of them was suckled by the mother. They seemed to be of different ages. A pregnant *Manis* that I once examined carried only one young one; and I do not think that they usually have more than one at a birth.

An adult male from Formosa is about a third larger than the ordinary run of Amoy specimens. It has longer, narrower, and darker scales; and those on the legs are compact and imbricated down to the toes. I at first thought that this "Tayowan Devil," so called by the early Hollanders, was of another species; but I can detect no differences in its skull. The size and colour of the scales I find very variable. The dark colour of the Formosan specimen is like that of the young Amoy animal. This may be owing to the difference of the earth in which it lives. The Amoy and Formosan adult skulls both have complete malar arches; but in the skulls of the Amoy young ones these gape apart, the unossified cartilage between having

been cleaned away. The Formosan *Manis* is constantly of a much larger size than the South-China animal; and it is not unlikely that on further study it will be found to be distinct.

The adult Amoy male above referred to I have placed in the College-of-Surgeons, and the rest of my series are in the British Museum.

A note on the behaviour of this animal in confinement will be found in the 'Zoologist' for 1858 (*l. s. c.*).

The *Manis* is not uncommon in many parts of Formosa, is abundant in the neighbourhood of Amoy, Swatow, and southern parts of China, extending to Hainan. How far it ranges north I have not ascertained.

CETACEA.

80. DELPHINUS (STENO) CHINENSIS, Osbeck. (South-China White Porpoise.)

Delphinus (*Steno*) *chinensis*, Flower, Trans. Z. S. vii. part 2, p. 151; Swinhoe, Zoologist, 1858, p. 6226.

This white Porpoise, which Professor Flower has so ably described (*l. c.*), is to be seen in all the rivers of South China, and probably extends into the Yangtsze, where white Porpoises occur as far up as Hankow (750 miles from the sea). Above that port, and on to Ichang (1110 miles from the sea), we noticed a smaller and apparently different form, also white in colour. I have been told that black Porpoises occur at the mouth of the Shanghai river, and I have myself seen a school of small black Dolphins at sea north of Amoy (Swinhoe, 'North-China Campaign,' 1860, p. 10); but beyond their occurrence I know nothing more of them. I have never seen Porpoises of any kind off the coast or in the rivers of Formosa.

81. BALÆNOPTERA SWINHOII. (Swinhoe's Fin-whale.)

Balænoptera swinhoii, Gray, P. Z. S. 1865, p. 725.

A large Finner-whale was cast on the sands of Formosa two miles below the port of Takow in 1862. In 1864 I collected all the bones of it that remained, and sent them to the British Museum. On view of these, Dr. J. E. Gray has established this species. Since then some more remains have been collected and sent home. This Whale resorts to the Hainan seas in winter, where the Chinese pursue it for the oil it yields. In summer it occurs in the Namoa straits and off the Port of Swatow. A party of Americans thought to establish a fishery at Swatow, but after one or two captures they gave up the scheme. They found the Whale useless for their purposes.

82. ?MEGAPTERA KUZIRA (Temm. & Schl.). (South-China Small Finner.)

One day at Takow in March 1865 I was roused by the cry of "Hai-yang" (or Whale), and heard that one had just been stranded. I crossed the harbour and made for the spot. On the road I met several parties of Chinamen returning laden with portions of the poor monster. On arriving at the spot I found little left beside the jaw and a part of the back; and even these were being hacked and





G.H.Ford.

W.West imp

Cheloderma expansa





G.H.Ford

W.West imp

Chelodina expansa.

fought over. The creature must have been either sick or foolish; for it wandered close to the shore just round the rocks at the entrance of the small harbour. A Manillaman observed it, and, getting a hammer, rushed into the water and struck it a severe blow on the head. He then hailed some Chinese to assist in getting it ashore. It measured, I was told on tolerably good authority, about 20 feet, and had no fin on its back. I saw parts of its belly, and observed that it was plaited across. Its colour was of a leaden black above, and whitish beneath. I saw one man carrying away its pectoral flippers, and two others its tail. I seized a piece of the baleen and sent it to the British Museum, but it unfortunately never reached its destination. Viewed exteriorly, it was like a high comb, the teeth (so to speak) being about 3 inches high and set about one-sixth of an inch apart, worn into bristles at their tips. Viewed from inside, you saw nothing but close-set whitish coarse hairs or bristles. Examined separately, each plate of baleen was shaped like a lob-sided triangle leaning outwards, coloured blackish blue like ordinary whalebone, and broken up at the top for about an inch, and to a less extent along the inner edge, into coarse whitish hair. The width of each plate at the base was 1·25 inch. There was a sheen of purple about the dark parts of the animal, especially on the flippers and tail.

The gunboat 'Flamer' came into Takow a day or two after the occurrence above related; and her commander, Lieutenant Eaton, told me that he had met a large number of small Whales between our port and the Pescadores. He mistook them for a long line of breakers where the chart showed no shoal. He kept away, fearing that there might be some mistake in the chart, when some of the brutes began to throw their tails and cut antics in the water. He then saw that the danger was nothing more than a school of Whales. He said there must have been about fifty, most of them averaging 20 feet or more. He did not observe that they had any fin on the back. They spouted water.

From the nature of the baleen, our species must belong to the Balænopteridæ; and from the shape of its flippers and want of a conspicuous dorsal fin it must be a *Megaptera*. It is probable that it will be found to be the same species that occurs in the seas of South Japan.

10. Notes on Tortoises in the British Museum, with Descriptions of some New Species. By Dr. J. E. Gray, F.R.S. &c.

(Plates XXXIII., XXXIV.)

The genus *Peltastes* in my paper on Tortoises, read in March 1869*, contains many species which are not well defined; and therefore I

* See P. Z. S. 1869, p. 171.

have sent to the Society a synopsis of them, founded on the examination of the specimens in the Museum.

* *Dorsal and ventral shields with pale and dark rays; nuchal shield none.* India.

1. PELTASTES STELLATUS.

Thorax ovate, convex; dorsal shield grooved, with nine, fifteen, or more yellow rays; the lateral rays of the costal shields nearly parallel; marginal shields with four or more yellow rays; sternum black, or dark brown, with numerous nearly uniform yellow rays; nuchal plate none.

Testudo stellata, Gray, Cat. Shield Rep. p. 7.
T. elegans, Günther, Rept. British India, p. 4; P. Z. S. 1869.
T. geometrica, Hutton, Journ. As. Soc. Beng. vi. 1837, p. 689, t. 38.
T. megalopus, Blyth, Journ. As. Soc. xxii. 1865, p. 624.
Hab. Scinde (*Dr. Leith*); Ceylon; Himalaya (*Captain Boys*).

Var. 1. *actinoides*. The dorsal shields more or less convex, with fifteen or more yellow rays.

Testudo actinoides, Bell, Zool. Journ. vol. iii. p. 419, tab. xiv., Testudinata, tab.; Seba, vol. i. p. 126, t. 80. f. 3.
T. stellata, var., Gray Cat. Shield Rep. p. 7.

Var. 2. *elegans*. Shields black, with twelve rays; costal shields with eight or nine rays.

Young. Areolæ of shields brown, large, four- or five-rayed; sternal shields with a pale areola, and more or less broad black pale-rayed margin.

Testudo elegans, Schœpf, Testud. t. xxv. figs. 1, 2, 3 (copied Shaw's Zool. ii. t. vi.); Schweigger, Prodromus, p. 86.
T. stellata, Schweigger, p. 56; Gray, Syn. Rep. p. 12, t. 1. f. 1.
La géométrique, Lacépède, p. 137, pl. ix.; Seba, Thesaurus, vol. i. p. 126, t. 80. f. 8.
Hab. Ceylon and Scinde.

Var. 3. *maura*. Shell very black; costal shields with six or seven white rays. B.M.

Young. Shields black, with a yellow four-rayed cross on the costal shields. B.M.

Var. 4. *sebæ*. Shell young; shields yellow; areolæ large, pale, with a black spot on the upper and lower margins and a long spot on the side margin over the suture between the shields; marginal shields pale, with a very narrow dark front margin.

Seba, Thesaurus, vol. i. tab. 79. fig. 3.

Schweigger changed the name of the species because he did not believe that the Tortoise figured by Seba was the young of the same species. See 'Prodomus,' p. 86.

The specimens with many and with fewer rays are very distinct from each other; and I have not found any specimens which seem to

unite them. I was at one time inclined to regard them as species; but in the British-Museum series of the species are specimens of both varieties sent by the same persons from Ceylon, Himalaya, and Scinde, which makes it appear as if they were found intermixed together.

Schweigger did not consider Schœpf's specimen of the young animal (which is very characteristic of the fewer-rayed variety) the same as the specimen which he described; and therefore he changed the name to *stellatus*. Dr. Günther refers to Schœpf's figure without doubt, and to Schweigger's *Testudo stellata* with doubt (R. B. I. p. 4).

** *Dorsal shields with pale and dark rays; ventral shields not rayed; nuchal shield none.* India.

2. PELTASTES PLATYNOTUS. (Plate XXXIII.)

Thorax oblong, flat, with six broad uniform pale rays; areolæ uniform pale brown; marginal shields with a brown marginal areola, and two pale rays; sternum yellow, varied with black near the front or hinder margin of the shields, not rayed; underside of marginal shields with a very small marginal spot on the front edge.

Testudo platynotus, Blyth, Journ. As. Soc. xl. pp. 70–79; Theobald, Proc. Linn. Soc.

T. elegans, var., Günther, Rept. Brit. Ind. p. 5.

Hab. Burmah.

Blyth describes the flatness of the back as a peculiar character of the species; but it is only to be observed in one out of the three specimens in the British Museum; and he does not mention the plain underside, which is found in them all.

*** *Dorsal shields pale- and dark-rayed; nuchal shield distinct.* Africa.

3. PELTASTES GEOMETRICUS.

Thorax oblong, dorsal and upper edge of marginal plates black; areolæ small, of costal plates submarginal; costal plates with ten or more white rays; upperside of marginal plates with three or more white rays; sternum brown-varied, of the older specimens more or less pale-rayed on the lateral margins; underside of marginal plates pale, with a black streak on the front edge; *nuchal shield elongate, slender*; the vertebral plates more or less convex, sometimes elevated, tent-shaped.

Testudo geometrica, Gray, Cat. Sh. Rep. p. 8.

Peltastes geographicus, Gray, P. Z. S. 1869.

Var. 1. Shields conical, prominent.

Testudo geometrica, var. *tentoria*, Gray, Cat, Sh. Rep. p. 8 (not Bell). B.M.

Var. 2. The margin of the sternal shields black, yellow-radiated.

Hab. South Africa, Cape of Good Hope.

4. PELTASTES TENTORIUS.

The back of the shell black, with twelve or more narrow rays; underside white, with a large brown spot occupying the middle of the whole length of the sternum; underside of anterior and lateral marginal plates white, with a black anterior ray; posterior marginal shields all white; nuchal plate very small.

Testudo tentoria, Bell, Zool. Journ. iii. p. 420, t. xxiii. & xxiv.; Testud. t.

T. geometrica nigriventris, Gray, Cat. Sh. Rep. p. 8.

Hab. South Africa.

5. PELTASTES VERREAUXII.

Shell depressed, chestnut-brown, broader and slightly dentated behind; dorsal shields with narrow black-edged radiating streaks; areola small, black, and pale-varied; sternum brown, especially in the middle of its length; sternal shields with diverging pale rays, especially on the margin; nuchal shield small.

Testudo verroxii, Gray, Cat. Sh. Rep. p. 8.

Hab. South Africa.

6. PELTASTES SEMISERRATUS.

Thorax oblong, the hinder margin more or less serrated; dorsal shields black, deeply concentrically grooved; areola pale, large, subcentral, with a pale-brown broad radiating band, which sometimes becomes very wide, and often divides into two near the margin of the plates; the central ray of the vertebral and costal plates forms an uninterrupted streak on the back and sides; the marginal shields with one or two broad pale rays; the sternum white, with a few very broad black rays; nuchal plate elongate, triangular.

Young. Hinder edge very acutely serrated.

Var. Back depressed.

Testudo semiserrata, Gray, Cat. Sh. Rep. p. 9.

Hab. South Africa.

**** *Dorsal shields horn-coloured, black-varied; nuchal plate distinct.*

7. PELTASTES ELONGATUS.

This Tortoise is very variable in colour; some older shells are nearly uniform in colour, some others are nearly black, with a more or less pale edge to the dorsal and ventral shields; others are pale whitish, with a more or less broad black ring round the areola.

Testudo elongata, Gray, P. Z. S. 1856, p. 181, t. 9, and 1861, p. 139; Ann. & Mag. Nat. Hist. 1861, p. 218; Günther, Rep. Brit. India, p. 8; Blyth, Journ. As. Soc. vol. xxii. p. 639, xxiv. pp. 7–12, xxv. p. 448, xl. p. 75; Theobald, Journ. Linn. Soc. Zool. vol. x. p. 6, 1868.

Hab. India.

8. PELTASTES? MARGINATUS.

Testudo marginata, Gray, Cat. Sh. Rep. p. 11.
Peltastes? marginatus, Gray, P. Z. S. 1869, p. 173.

Var. *melas*, or male.

Testudo marginata, Schœpf's Testudin. tab. xi. & xii.

A very fine and adult specimen in the British Museum, obtained from Mr. Parry, from Greece, is oblong, very solid, black, with more or less large white spots on the areola of each plate, and a triangular spot on the hinder upper half of the lateral marginal plates, more or less white-varied; the hinder marginal plates are very broad, expanded, and spread out behind; the underside of the marginal plates is white, those of the front and hinder margins are edged with black; the sternum is concave in the middle and shelving on the sides, more or less varied with white, white towards the hinder edge; the hinder lobe is narrow, square, notched out behind; the anal plates nearly as wide as the abdominal; the front lobe is small, semicircular; the gular plates thick, white, slightly notched in front; the humeral plates very convex, swollen; the pectoral plates rather narrow, with the front edge nearly straight, and the hinder concave on the sides. Length over the back 12 inches; caudal and the other posterior marginal plates 1½ inch wide; the sternum 18½ inches long; hinder lobe 3 inches wide. Adult male.

Testudo marginata (specimen *a*), Gray, Cat. Sh. Rep. p. 11.
Hab. Greece.

There is a second specimen, without the sternum, with the hinder margin not so much produced, and the white on the lateral marginal plates more distinct. This specimen is something like *Testudo græca*, Linn., Schœpf, Testud. t. ix., but it is not quite so yellow.

Var. *whitei*, or female.

Testudo whitei, Bennett in White's Selborne.

A fine adult shell, with the hinder margin moderately expanded, and the caudal shield bent down and slightly inflexed; the sternum flat, the hinder lobe tapering behind, the anal shields being not more than two-thirds the width of the shields before them; the pectoral shields very short, not above one-fourth the length of the abdominal shields on the inner half, the outer half about double the width and square; the dorsal shields black; the areola varied with yellow; the hinder upper half of the marginal plates varied with yellow; the underside yellowish white, with a few irregular unequal-sized black spots. Adult female. The Tortoise described in White's 'Selborne,' and presented to the Museum in 1858 by Mrs. Christopher, niece of Mr. White.

9. PELTASTES LEITHII.

Testudo leithii, Günther, P. Z. S. 1869, p. 164.
Hab. Scinde.

I can see no difference between this and a young specimen of *Peltastes marginatus* in the British Museum, except that the shield is lighter-coloured; but the specimen of the latter was in confine-

ment. I keep them distinct because it is possible the adult may be different, as Dr. Leith assures me that he never saw a Tortoise in Sindh like the adult *T. marginatus* from Greece.

10. PELTASTES GRÆCUS.

Testuda græca, Gray, Cat. Sh. Rept. p. 10.
Petastes græcus, Gray, P. Z. S. 1869, p. 173.
Hab. Shores of the Mediterranean; Italy, Greece, &c.

***** *Dorsal shields horn-coloured; nuchal shield none.* Africa.

11. PELTASTES SULCATUS.

Testudo sulcata, Gray, Cat. Sh. Rept. B. M. p. 9.
Peltastes sulcatus, Gray, P. Z. S. 1869, 173.
Hab. Central Africa.

TESTUDO HORSFIELDII, Gray, Cat. Sh. Rept. p. 7, t. 1, has been referred to the genus *Homopus*, and noticed under the name of *Homopus burnesii* by Blyth, because it has four claws on each foot; but it has not the alveolar surface of the jaws; and the general form of the shell is very like that of the genera *Testudo* and *Peltastes*, and very unlike that of the true *Homopus*; therefore I have found it necessary to form for it a new genus named *Testudinella*.

TESTUDINELLA.

Head covered with large thin plates on the nose and crown, with small polygonal scales over the orbits, nape, and temples. Horny sheath of the upper jaw rather high, with a deep broad notch in the upper edge of the front for the nose-disk, keeled in front. The dental edge acute, with a notch on each side and an acute keeled central lobe. Lower jaw rather strong, with a sharp denticulated dental edge and a rounded prominence in front. Alveolar surface with a small pit in front and a deep groove parallel to the whole outer margin; of the lower jaw with a distinct and narrow ridge on the inside, extending nearly the whole length of the outer margin of the jaw. Skull with a slender, short, scarcely prominent zygomatic arch, much narrower than the orbit or the tympanum. Thorax hemispherical, with a distinct nuchal shield. The fore legs covered with thick, large, triangular scales. Toes 4 . 4.

Homopus, sp., Blyth.

1. TESTUDINELLA HORSFIELDII.

Testudo horsfieldii, Gray, Cat. Sh. Rept. p. 7 (1855).
Homopus burnesii, Blyth, Journ. As. Soc. xxii. p. 641 (1853).
Hab. Hindostan.

RHINOCLEMMYS.

In the Proc. Zool. Soc. 1869, p. 189, I described two distinct species of this genus, divided into two sections. I have lately received from M. A. Sallé a very distinct species belonging to the first

section of the genus, distinguished by the general pale colour of the shell and animal, the very slight indication of the dorsal keel, and by the peculiar distribution of colour on the crown of the head.



Rhinoclemmys mexicana.

1. RHINOCLEMMYS MEXICANA.

Thorax oblong, slightly and bluntly keeled only in front, over the vertebral plates, dark brown, slightly mottled; dorsal and marginal shields thin; the first vertebral shield nearly square, four-sided, the second and third oblong, transverse, six-sided; sternum slightly raised on the sides, truncated in front and notched behind; dark brown, with an irregular yellow margin; head brown; throat and sides of the head yellow, black-spotted; crown dark brown, with a narrow white streak over the nostrils towards the orbits, with a broad white lunate band behind, with its front edge just even with the eyes, and with an indistinct broad pale streak on each side of the occiput.

Hab. Mexico; San Juan del Rio (*Rébouch*).

CHELODINA.

CHELODINA EXPANSA, Gray. (Plate XXXIV., young.)

This species was first described in the Society's 'Proceedings' for 1856 (p. 370), and the young shell was described and was intended to have been figured. The engraving was made of it at the time, but not published; it is therefore appended to this paper.

11. Descriptions of Ten New Species of Land-shells, collected by Mr. W. F. Petterd, of Hobart Town, Tasmania. By JOHN BRAZIER, C.M.Z.S.

1. HELIX (CHAROPA) CURAÇOÆ, n. s.

Shell rather widely umbilicated, depressed, thin, very closely and finely plicately ribbed, interstices smooth, white, not shining; spire

depressed, suture rather deep; whorls 4½, rapidly increasing, convex, last large, rounded, not descending in front, base convex, ribbed the same as the upper surface; umbilicus perspective; aperture oblique, roundly lunate; peristome simple, thin, acute, columellar margin slightly reflected.

Diam. maj. 0·25, min. 0·20, alt. 0·13 unc.

Hab. Near Mount Wellington, Tasmania (*Coll. Brazier*).

This fine species I have named in honour of Her Majesty's steamship 'Curaçoa.'

2. Helix (Charopa) ricei, n. s.

Shell umbilicated, depressed, thin, very finely and regularly striated, interstices decussated, white, not shining; spire depressed, suture moderately deep; whorls 4, convex, last large, rounded, base convex, striated the same as the upper surface; umbilicus large, funnel-shaped; aperture ovately lunate; peristome simple, acute, margins distant, basal slightly reflected over the umbilicus.

Diam. maj. 0·18, min. 0·14, alt. 0·11 unc.

Hab. Foot of Mount Wellington, Tasmania (*Coll. Brazier*).

This species comes very close to *Helix curaçoæ*; it differs from that species by its peculiar funnel-shaped umbilicus and the regular silky appearance of the striæ.

3. Helix (Charopa) rotella, n. s.

Shell with a deep umbilicus, orbicularly depressed, rather thin, shining, closely and finely striated, interstices decussated, rusty brown; spire slightly raised, suture deep; whorls 4½, convex, last rounded, not descending in front, base convex, closely and finely sculptured, excavated round the umbilicus; aperture roundly lunate; peristome simple, margins distant, columellar margin not reflected.

Diam. maj. 0·19, min. 0·15, alt. 0·10 unc.

Hab. Foot of Mount Wellington, Tasmania (*Coll. Brazier*).

4. Helix (Charopa) onslowi, n. s.

Shell umbilicated, orbicularly depressed, very finely and closely plicately striated, covered with a brownish epidermis, under the epidermis white, not shining; spire moderately flat, suture grooved; whorls 4½, convex, last slightly descending, base convex, sculptured the same as the upper surface and running into the umbilicus, which is large, almost perspective; aperture roundly lunate; peristome simple, columellar margin not reflected at the base.

Diam. maj. 0·16, min. 0·15, alt. 0·10 unc.

Hab. Mount Wellington, Tasmania, under leaves (*Coll. Brazier*).

5. Helix (Charopa) neglecta, n. s.

Shell umbilicated, depressedly convex, thin, obliquely faintly and irregularly striated; whorls regularly marked above with alternate light-red and brown segments; whorls 4½, convex, excavated at the suture, the last not descending, base convex, brown; umbi-

licus deep; aperture roundly lunate; peristome thin, acute, margins nearly approximating, columellar margin not reflected.

Diam. maj. 0·13, min. 0·11, alt. 0·08 unc.

Hab. Knocklofty; also the Old Mill, Hobart Town, Tasmania, under logs (*Coll. Brazier*).

This species comes near to *H. tasmaniæ*, Cox, from Mount Wellington—a rare shell to obtain; whereas *H. neglecta* is a very common species in the localities I have given.

6. HELIX (CHAROPA) AMMONITOIDES, n. s.

Shell umbilicated, flatly discoid, not shining, finely and prominently irregularly ribbed, the interstices with very fine striæ, white beneath a thin brownish epidermis; spire flat, suture slightly impressed; whorls 3½, very regularly increasing, last rounded above and below, base convex, with striæ the same as on upper surface; umbilicus large, with the bottom flat, not very deep; aperture oblique, roundly lunate; peristome simple, the thin epidermis covering it, margins approximating.

Diam. maj. 0·11, min. 0·10, alt. 0·5 unc.

Hab. Mount Nelson, Tasmania, under stones in moist places (*Coll. Brazier*).

This little species has the appearance of an Ammonite in form; but it must not be confounded with *Helix ammonitoides* of Reeve, which is only a synonym of *Helix omicron*, Pfr.

7. HELIX (?CHAROPA) DISPAR, n. s.

Shell umbilicated, depressedly convex, arcuately, coarsely, and sharply ribbed, interstices with very fine radiating striæ, bright, horny; spire conoidly obtuse, suture depressed; whorls 5 to 5½, convex, last rounded, not descending, base convex, with radiating striæ descending into the deep umbilicus; interior of the aperture with a little oblong white prominent callous tooth nearly on the base; aperture vertical, semilunar; peristome simple, acute, margins joined by a thin callus (in some specimens prominent), basal margin not reflected.

Diam. maj. 0·13, min. 0·11, alt. 0·11 unc.

Hab. Mount Wellington, Tasmania, under leaves (*Coll. Brazier*).

This species is the only one I know of in Tasmania with the small tooth in the interior of the aperture. We have *H. biscutata*, said to come from the same locality, but none so small as the present little species, which is somewhat like a small species that I have from Norfolk Island.

8. HELIX (HYALINA) NELSONENSIS, n. s.

Shell umbilicated, depressed, very thin, shining, pellucid, obliquely and finely striated; spire slightly elevated, obtuse; whorls 3½, last increasing, convex, slightly depressed above at the mouth, base convex, faintly marked with indistinct striæ of a reddish horn-colour; umbilicus moderately large; aperture nearly diagonal, slightly

ovately lunate; peristome thin, simple, margins approximating, columellar very slightly dilated above.

Diam. maj. 0·15, min. 0·11, alt. 0·06 unc.

Hab. Mount Nelson, Tasmania (*Coll. Brazier*).

9. HELIX (VIDENA) KINGI, n. s.

Shell umbilicated, convexly depressed, rather thin, very closely and irregularly finely striated and decussated, not shining, horny brown; spire conoidly convex, obtuse at the apex, impressed at the suture; whorls 5½, convex, last large, depressed in front, somewhat angled at the periphery, base rounded and marked with decussating striæ; umbilicus deep, subcompressed; aperture slightly oblique, lunately oval; peristome simple, margins approximating, columellar margin expanded and reflected.

Diam. maj. 0·37, min. 0·29, alt. 0·30 unc.

Hab. Ringarooma, Tasmania, under logs (*Coll. Brazier*).

10. HELIX (HEMIPLECTA) FORDEI, n. s.

Shell perforated, convexly depressed, thin, closely, finely, obliquely, irregularly striated, horny green; spire slightly raised, acute; whorls 4, convex, increasing, last large, grooved at the suture, keeled at the periphery, base convex, moderately smooth; aperture oblique, lunately rounded; peristome simple, margins distant, columellar margin dilated and reflected, almost covering the small perforation.

Diam. maj. 0·30, min. 0·22, alt. 0·16 unc.

Hab. Springs, Mount Wellington, Tasmania (*Coll. Brazier*).

This species approaches in miniature *Helicarion sophiæ*, Gaskoin, from Lord Howe's Island.

12. Notes on two Australian Land-shells.

By JOHN BRAZIER.

HELIX (GALAXIAS) MEADEI.

Helix edwardsi, Cox, Mon. Austr. Land-shells, p. 109, pl. 19. f. 3.

Hab. The banks of the Liverpool River, Arnheim's Land, North Coast of Australia (*Coll. Brazier*).

The specific name is altered, because Mr. Bland described in 1858 an American species under the name of *H. edwardsi*.

HELIX (PATULA) STELLATA.

Helix (*Discus*) *similis*, Cox, Mon. Austr. Land-shells, p. 23, pl. 12. f. 12.

Hab. Mount Wellington, Tasmania (*Masters and Petterd*).

The change in the specific name is necessary, as C. B. Adams described a Jamaican *Helix similis* many years ago.

November 1, 1870.

Professor Newton, F.R.S., V.P., in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the months of June, July, August, and September, 1870:—

The total number of registered additions to the Society's Menagerie during the month of June 1870 was 195, of which 47 were by birth, 31 by presentation, 84 by purchase, 13 by exchange, and 20 were animals received on deposit. The total number of departures during the same period, by death and removals, was 121. Amongst the additions the most remarkable were:—

1. Two Australian Sacred Ibises (*Ibis strictipennis*, Gould, B. Austr. vi. pl. 46), purchased June 13th.

The acquisition of these two birds is of much interest, as enabling the naturalist to compare together living examples of the four closely allied forms of Sacred Ibis—*Ibis æthiopica* of Africa, *I. bernieri* of Madagascar*, *I. melanocephala* of S. Asia, and *I. strictipennis* of Australia.

2. A male Leonine Monkey (*Macacus leoninus*), purchased June 14th from a London dealer.

In July 1869 we obtained by presentation from Capt. R. A. Brown, as already recorded in these 'Proceedings' (1869, p. 467), a female Macaque Monkey, which had been brought by H.M.S. 'Vigilant' from the Andaman Islands. In a notice of the habits of this Monkey, published in 'Land and Water' of July 24th, Mr. Bartlett, considering the species to be undescribed, proposed to call it *Macacus andamanensis* (Land and Water, viii. p. 57), which name, I observed in my above-mentioned notice of it in the Society's 'Proceedings,' "would stand if the validity of the species should be confirmed by future researches." "Andaman Jenny," as this Monkey was called, has attracted considerable attention amongst the visitors to the Society's Gardens by smoking pipes and playing other extraordinary tricks, of which Mr. Bartlett has given an account in the article above referred to. Her fame having reached as far as the islands from which she was brought, Capt. Hamilton, commanding a detachment there, was induced to write to Dr. E. Hamilton, F.Z.S., to inform him that it was an error to suppose that "Andaman Jenny" was really a native of these islands, she and several companions of the same species having been brought over to Ross Island, one of the Andamans, from the adjacent mainland of Burmah†. Thus it appeared that, even if Mr. Bartlett was right in referring this Monkey to a new species (of which, I confess, I had at the time serious doubts), his name would require alteration. The matter stood thus until June last, when Mr. Bartlett informed me one

* On the distinctness of this form from *I. æthiopica*, see my remarks, P. Z. S. 1870, p. 381.

† *Cf.* P. Z. S. 1870, p. 220.

morning with great satisfaction that he had secured for the Society on approval a male of the so-called "Andaman Monkey," and that there could be no longer any doubt of its being a most distinct species, and quite new to us in this country. On visiting the Gardens next day to examine our new acquisition, I found that Mr. Bartlett's statement was amply justified by the facts. The male Monkey was certainly of a species quite new to myself and others, and one of which there was no specimen in the British Museum. But on showing it to Mr. Blyth, his experienced eye at once detected that it was of a species which had been received in Calcutta from Aracan in 1844, and, after several attempts to refer it to described species†, had been named by him *Inuus leoninus*.

I now exhibit a drawing by Mr. Wolf of this remarkable addition to our series of living Quadrumana. The species, as has been already observed, is no doubt most nearly allied to the Pig-tailed *Macacus nemestrinus*, but is at once recognizable by the peculiar crescent-shaped arrangement of the elevated hairs forming the crest on the head, the more vivid colouring, and the longer tail. An exact description must be deferred until the decease of the animal; but the accompanying figure (Plate XXXV.) will render it easily recognizable.

The total number of registered additions to the Society's Menagerie during the month of July 1870 was 199; of these 27 were by birth, 31 by presentation, 121 by purchase, 1 by exchange, and 19 were received on deposit. The total number of departures during the same period, by death and removals, was 168.

The most remarkable additions during the month of July were:—

1. Three Trumpeter Swans (*Cygnus buccinator*), hatched on the Three-island Pond in the Society's Gardens on July 6th, being the first instance of this American species having bred in the Society's Gardens, and, as far as it is known, in Europe.

The Cygnets of the Trumpeter Swan are of a uniform ashy grey in their first plumage, darker than in the corresponding plumage of *C. olor*. They are now moulting, and seem to be whiter on the breast and darker on the back than the Common Swan at the same period.

On the same day also (July 6th) a large and valuable collection of living animals, sent from the Zoological Gardens of Santiago, in Chili, under the care of Mr. Albert Weisshaupt, arrived in the Society's Gardens. Of these the following selection, embracing examples of all the best species, was acquired for the sum of £462:—

MAMMALS.

*2 Chilian Skunks	*Mephitis chilensis*.
*2 Magellanic Jackals	*Canis magellanicus*.
3 Patagonian Cavies	*Dolichotis patachonica*.
3 Chinchillas	*Chinchilla lanigera*.
2 Coypus	*Myopotamus coypus*.

† *Macacus nemestrinus*, Blyth, J. A. S. B. xiii. pt. 1, p. 473. "*Inuus arctoides*, Is. Geoffr.;" Blyth, ibid. xvi. pt. 2, p. 731. *Inuus leoninus*, Blyth, Cat. Mamm. Mus. As. Soc. Beng. p. 7. *Hab.* Aracan.



F. Smit lith. M. & N. Hanhart imp.

MACACUS LEONINUS.

Birds.

3	Patagonian Conures ..... *Conurus cyanolyseos.*
1	Slight-billed Parrakeet ..... *Henicognathus leptorhynchus.*
1	Condor ..... *Sarcorhamphus gryphus.*
*8	Black-winged Doves ..... *Metriopelia melanoptera.*
6	Spotted Doves ..... *Columba maculosa.*
*5	Auriculated Doves ..... *Zenaida auriculata.*
3	Black-faced Ibises ..... *Ibis melanopis.*
3	Cayenne Lapwings ..... *Vanellus cayennensis.*
*3	Burmeister's Cariama ..... *Chunga burmeisteri.*
4	Black-necked Swans ..... *Cygnus nigricollis.*
*2	Coscoroba Swans ..... *Cygnus coscoroba.*
*6	Rosy-billed Ducks ..... *Metopiana peposaca.*
*8	Chilian Pintails ..... *Dafila spinicauda.*
*6	Chiloe Widgeons ..... *Mareca chiloensis.*

Reptiles.

1	Annulated Terrapin ..... *Geoclemmys annulata.*
1	Large-footed Land-tortoise .... *Testudo elephantopus.*
*2	Chilian Land-tortoises ..... *Testudo chilensis.*

It will be observed that the whole of this collection consisted of animals of great interest, no less than 11 out of the 22 species (those marked *) having never been previously received alive by the Society. Those more especially calling for remark are:—

2. Mephitis chilensis.

This is a smaller species of Skunk than any of which we have hitherto received living examples. Our pair, which seem to be adult, measure only 9 inches, and the tail 6½ inches; total, from nose to end of tail, 15½ inches in length. The male and female are nearly alike, black, with a narrow white lateral stripe on each side, nearly joining on the forehead. This stripe is more elongated in the male. There are traces of white hairs at the base of the tail. The animal seems to agree best with the *Conepatus nasutus*, var. 3. *chilensis*, of Dr. Gray's Catalogue of Carnivora (p. 135). But the confusion amongst the different species of Skunks is very great.

These animals are very tame, and allow themselves to be handled with impunity.

3. Canis magellanicus, Gray; Waterhouse in Zool. Voy. Beagle, ii. p. 10, pl. 5.

A pair of this fine and distinct species of *Canis*, of which we have never before received living examples. The pupil is round in this species.

4. The specimen of the Condor (*Sarcorhamphus gryphus*) received in the present collection is very remarkable for the enormous development of the wattles on the head and throat, and resembles the figure of this bird given in Temminck's Pl. Col. 494, from a specimen formerly in the Leverian Museum.

5. CHUNGA BURMEISTERI. (Plate XXXVI.)

The acquisition of living examples of this recently discovered second form of the peculiar Neotropical family *Cariamidæ* is of special interest.

Burmeister's Cariama was discovered by the eminent naturalist whose name it bears in the provinces of Catamarca and Tucuman, in the north of the Argentine Republic, in 1859, and was first described by Dr. Hartlaub in this Society's 'Proceedings'*. Soon afterwards Reichenbach† gave the species the generic rank which it seems entitled to, and called it *Chunga burmeisteri*. As this remarkable bird is very little known, and specimens of it are very rare, the accompanying drawing (Plate XXXVI.) will be acceptable. We may hope that at a later period some one will undertake a special comparison of its structure with that of *Cariama*, which has been so well worked out by Burmeister‡.

6. CYGNUS COSCOROBA, Mol.; Gray and Mitchell, Gen. of Birds, iii. pl. 166.

These are the first examples of this beautiful little Swan that have reached us alive. They were in poor condition when they first arrived, but are now in good health, and may, we hope, breed next spring; so that there is some chance of the introduction of this fine species into our ornamental waters.

7. METOPIANA PEPOSACA§. (Plate XXXVII.)

A single male of this fine Duck was received in 1867‖. From the present collection we have obtained three pairs, so that there is every hope for the continuance of the species.

8. DAFILA SPINICAUDA. (Plate XXXVIII.)

There has been a good deal of confusion about this elegant species of Pintail, of which we have now for the first time received living specimens. Dr. Burmeister has been inclined to consider that there were two allied species—*D. spinicauda*, from the east of the Argentine Republic, and *D. oxyura*, from Mendoza, Chili, and Peru (La Plata-Reise, ii. p. 515); but, as Mr. Salvin and I have already stated (P. Z. S. 1869, p. 157), we believe that he has been in error upon this point. *D. spinicauda* is closely allied in shape and form to the so-called Bahama Duck (*D. bahamensis*), which has long been an inhabitant of the Society's Gardens, but is readily distinguishable by its yellow-marked bill and other peculiarities. The species, which has never been figured, is well represented in the accompanying drawing (Plate XXXVIII.).

* P. Z. S. 1860, p. 335.

† Handb. d. Sp. Orn. Tauben, p. 159.

‡ "Beiträge z. Naturgeschichte d. Seriema," Abh. Nat. Ges. Halle, i. p. 11 (1854).

§ *Anas peposaca*, Vieill. Enc. Méth. p. 357. *Metopiana peposaca*, Scl. et Salv. P. Z. S. 1868, p. 146.

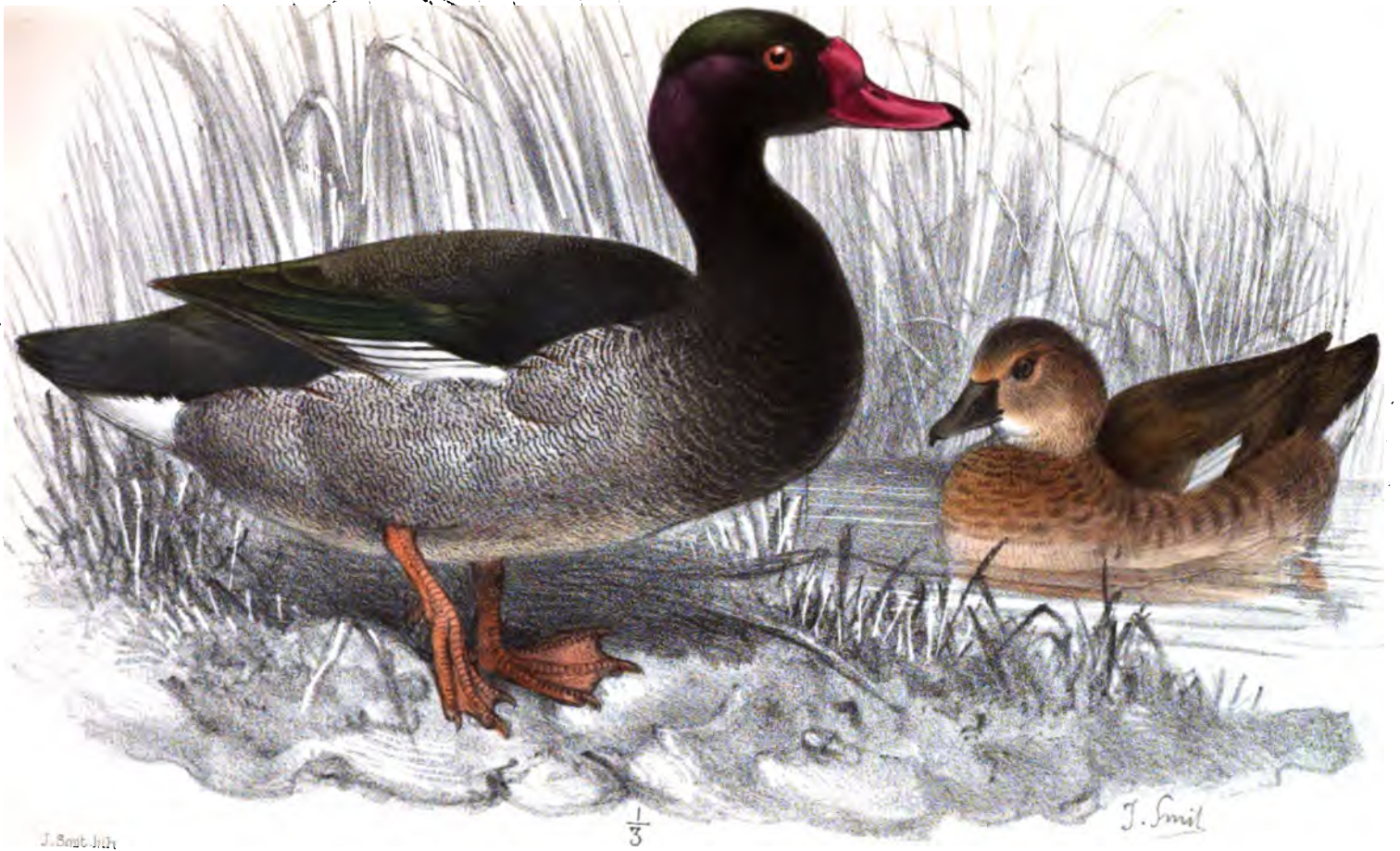
‖ See P. Z. S. 1867, p. 687.



J. Smit lith.

M & N Hanhart imp.

CHUNGA BURMEISTERI.

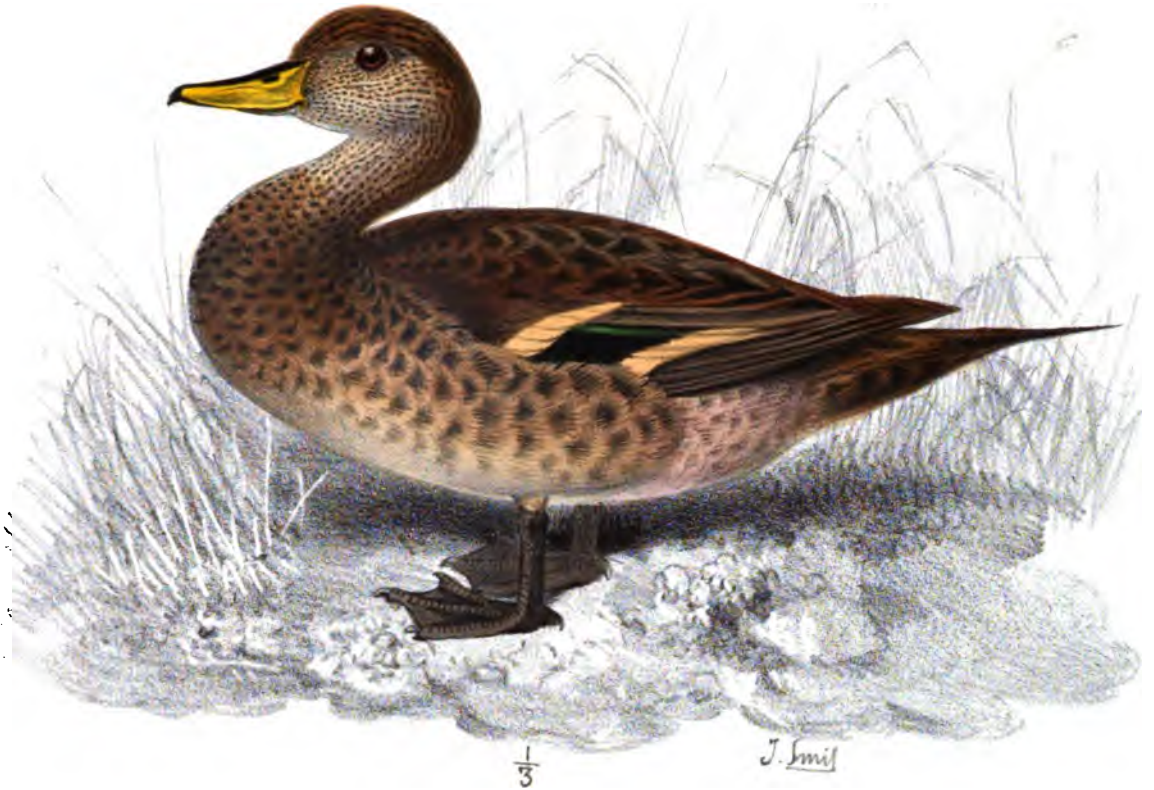


J. Smit. lith.

$\frac{1}{3}$

METOPIANA PEPOSACA

Mintern Hanhart imp.



J.Smit lith.

M&N.Hanhart imp

DAFILA SPINICAUDA.

9. MARECA CHILOENSIS (King).

The Chiloe Widgeon also, although well known in collections, is new to our series of living *Anatidæ*, and forms a fine addition to them. It is sufficiently well figured by Eyton in his 'Monograph' (pl. 31). The sexes (contrary to the usual rule in this section of the *Anatidæ*) are coloured nearly alike.

10. GEOCLEMMYS ANNULATA, Gray.

This Tortoise was described and figured by Dr. Gray in our 'Proceedings' (1860, p. 231, t. 29), from specimens obtained by Mr. Fraser on the coast of Ecuador. The present example was probably brought to Santiago from the coast of Peru or Ecuador, as Gay (Fauna Chilena, ii. p. 8) and other authorities assure us that no species of Chelonian is found in Chili.

11. TESTUDO ELEPHANTOPUS, Harlan.

Dr. Gray has identified one of the two Tortoises which we obtained in the present collection with the above-named species, originally described by Harlan as coming from the Galapagos Islands. The present individual was probably imported into Chili from the same quarter as the *Geoclemmys annulata*, as Mr. Cope (Pr. Ac. Sc. Phil. 1868, p. 96) has recorded the occurrence of the species on the coast of Ecuador.

12. TESTUDO CHILENSIS, Gray.

Testudo (*Gopher*) *chilensis*, Gray, Ann. Nat. Hist. ser. 4, vol. vi. p. 190.

Dr. Gray has lately described this Land-tortoise, of which we received two specimens, as a new species, and has proposed to call it *Testudo chilensis*. I do not profess to be specially acquainted with the *Testudinata*; but I must observe that, if this species be really new, Dr. Gray has chosen a most unfortunate name for it; for, as already above mentioned, the best authorities deny the existence in Chili of any animals of this order; and, as we know several other species in the present collection were imported from different parts of the South-American continent, it is, of course, obvious that the same may have been the case with the present animals. Now Duméril and Bibron (Erpétologie Générale, ii. p. 74) record the occurrence on the Rio Negro, in Northern Patagonia, of a species of Tortoise (*Testudo stellata*), to which the present animal, according to Dr. Gray, is very nearly allied; and Burmeister (La Plata-Reise, ii. p. 521) tells us that this *T. stellata* is common in the vicinity of Mendoza and all over the neighbouring pampas of the Argentine Republic. I have no doubt whatever, therefore, that the present Tortoises are from La Plata, and belong to the species called *Testudo stellata* by D'Orbigny and Burmeister. It is very probable that Dr. Gray may be right in separating the species from *T. stellata* of Africa; but it would have been better to have called it by some other name*.

* For further remarks on this Tortoise, see Ann. Nat. Hist. ser. 4, vol. vi. p. 470.

13. A Spider Monkey brought home from Trinidad, and presented to the Society by the Hon. Arthur Gordon, C.M.Z.S. and lately Governor of that colony, on the 14th of July. Mr. Gordon informs me, in reply to inquiries, that this Monkey was obtained for him by one of his correspondents from the upper part of the Caura River, a southern confluent of the Orinoco, and was considered to be a very rare species. I was inclined to refer it to *Ateles belzebuth* of Geoffroy St.-Hilaire (Ann. d. Mus. vii. p. 271), and have inserted it in the Register under this name. But the animal having unfortunately died, and having been sent to the British Museum, is, as I am informed, considered by Dr. Gray to be probably a female of his *Ateles bartlettii* (P. Z. S. 1867, p. 992, pl. XLVII.).

I do not think this is probable. I take Dr. Gray's *Ateles bartlettii* to be the same as *Ateles variegatus* of Wagner (Schreb. Suppl. i. p. 313, et Abh. Acad. Munich, v. p. 420), which was discovered by Johann Natterer on the Upper Rio Negro in 1831. Now Wagner's description of *A. variegatus* (which agrees exactly with *A. bartlettii*) was, as he informs us, taken from a female; so that in this species the sexes must be nearly alike*.

14. A young Hornbill, of a species closely allied to *Buceros cylindricus*, Temm.,—of which the bill only is figured in 'Planches Coloriées' (Pl. Col. 521), but the bird itself is described by Hartlaub (Orn. Westafr. p. 162),—and to *B. fistulator*, Cassin.

As, however, it is not identical with either of these species, I subjoin a short diagnosis of it, which, together with the accompanying figure, taken from the living bird, will, I think, render it easily recognizable:—

BUCEROS SUBCYLINDRICUS, sp. nov. (Plate XXXIX.)

Niger cristatus: capitis plumis albescente cinereo variegatis; dorso postico, campterio alari et alarum dimidio apicali albis, remigibus tribus externis exceptis nigris: subtus niger; ventre imo, tibiis et crisso albis; cauda alba: rectricibus duabus intermediis totis, nisi ad ipsum apicem, et rectricum lateralium fascia lata basin versus nigris; rostro et pedibus nigris; rostri culmine elevato, valde compresso, cultrato, arcuato: iridibus rufis: long. tota 24, *alæ* 11·5, *caudæ* 10, *rostri a rictu* 4, *poll. Angl. et dec.*

Hab. Africa occidentalis.

Obs. A *B. cylindrico*, capite maculato et rectricibus mediis nigris, a *B. fistulatore* capite maculato et secondariis omnino albis distinguendus.

15. A rare Southern Asiatic Blindsnake (*Typhlops nigro-albus*, Dum. et Bibron; Günther, Ind. Rept. p. 172), purchased July 19th. The species was identified for us by Dr. Günther, to whom the Society is greatly indebted for the determination of the Reptiles in their living collection.

16. A second example of the new Kangaroo which I described

* *Cf.* Ann. Nat. Hist. ser. 4, vol. vi. p. 472.



J. G. Keulemans lith.

M. & N. Hanhart imp.

BUCEROS SUBCYLINDRICUS

and figured at a recent Meeting of this Society as the Roan Kangaroo (*Macropus erubescens*, P. Z. S. 1870, p. 126, Pl. X.). The receipt of this animal, which is a male, like the former one, is of great interest, as confirming the validity of this fine species.

17. Two male Galeated Curassows (*Pauxi galeata*), brought to this country from the port of Santa Martha, New Granada, in company with a female of *Crax alberti*. This Curassow is very scarce in living collections, and appears not to have been exhibited in the Society's Menagarie since 1830.

18. A Lemur of a species quite new to the Society's collection, purchased July 29th. This animal died, unfortunately, soon after its arrival, and upon being taken to the British Museum for examination proved to be, in Dr. Gray's opinion, a large specimen of *Hapalemur olivaceus*, I. Geoffr. Cat. de Mamm. p. 75*.

19. A male specimen of the Ethiopian Ant-bear (*Orycteropus æthiopicus* of Sundevall). This animal has been placed in the Gardens in company with the Cape Ant-bear (*O. capensis*), received



Orycteropus æthiopicus.

18th June, 1869. The two animals, although both males, live sociably together, and enable a comparison to be made between the external appearances of these two disputed species. Duvernoy has already enlarged upon the differences between the skeletons of the

* Dr. Gray has, however, more recently described it as a new species (*Hapalemur simus*), P. Z. S. Dec. 6. 1870.

two forms (Ann. Sci. Nat. ser. 3, vol. xx. p. 181); and, as will be allowed by every body, the comparison of the living specimens serves to confirm their distinctness. The chief noticeable differences in the living animals are the more hairy body, especially on the lower back and flanks, the shorter, thicker tail, and the shorter head and ears in the *O. capensis*. The insides of the nostrils at their openings are thickly covered with hair in *O. capensis*, which is not nearly so much the case in *O. æthiopicus*.

The total number of registered additions to the Society's Menagerie during the month of August 1870 was 179; of these, 5 were by birth, 37 by presentation, 49 by purchase, and 88 were received on deposit. The total number of departures during the same period, by death and removal, was 96. The most noticeable of the additions were:—

1. A Pluto Monkey (*Cercopithecus pluto*) from West Africa, purchased August 3rd. This is a scarce species which was described and figured by Dr. Gray in the Society's 'Proceedings' as long ago as 1848 (*cf.* P. Z. S. 1848, p. 56, Mamm. pl. III.). I am not aware that there has ever been a second living example in the Society's Menagerie. The Pluto Monkey is perhaps most closely allied to *C. albogularis*, Sykes.

2. Two Pheasants of a species allied to *Phasianus colchicus*, deposited by Mr. J. J. Stone on the 14th of August. These Pheasants had arrived from one of Mr. Stone's Chinese collectors in company with specimens of *Thaumalea amherstiæ*, and were doubtless from the same locality—that is, from the slopes of the Yung-ling mountains beyond Ta-kien-leu, on the Chinese confines of Thibet. Mr. Elliot has lately described this species (Ann. Nat. Hist. ser. 4, vol. vi. p. 312), and proposed to call it *Phasianus elegans*.

3. Three Roseate Spoonbills (*Platalea ajaja*), purchased August 14th, being the first examples of this species ever received alive by the Society.

The total number of registered additions to the Society's Menagerie during the month of September 1870 was 76; of these, 4 were by birth, 53 by presentation, 10 by purchase, 3 by exchange, and 6 were received on deposit. The total number of departures during the same period, by death and removal was 133.

Amongst the additions the most remarkable were:—

1. A Red-necked Bustard (*Eupodotis ruficollis*), purchased September 1st, having been imported from Natal by Capt. A. Davis. This large Bustard has never been previously exhibited alive in the Society's Gardens.

2. Two female Dorsal Squirrels (*Sciurus dorsalis*, Gray), received from the Jardin d'Acclimatation of Paris on the 7th of September, and making with the two males already in the Society's Gardens two pairs of this beautiful Squirrel. *Sciurus dorsalis* was first described by Dr. Gray in the Society's 'Proceedings' in 1848, from specimens obtained by M. Sallé in Nicaragua (*cf.* P. Z. S. 1848, p. 148, Mamm.

pl. VII.). The locality there given by Dr. Gray is erroneously stated to be Caraccas. More recently several examples of this species have been brought to Europe, and shows that this Squirrel, like several of its congeners, is very variable in its colouring, some of them being nearly wholly rufous, whilst others are white except on the dorsal streak, as shown in Dr. Gray's figure (*cf.* Gray, Synopsis of American Squirrels, Ann. Nat. Hist. ser. 3, vol. xx. p. 422).

3. A pair of Daubenton's Curassows (*Crax daubentoni*, G. R. Gray), presented on the 29th of September by James Wright, Esq., having been received by that gentleman from Tucacas, a port in Northern Venezuela. This addition is of importance, as the species has not been previously received alive by the Society, and its exact locality was a little uncertain.

A seventh letter* on the Ornithology of Buenos Ayres, by Mr. W. H. Hudson, C.M.Z.S., was read:—

"Buenos Ayres, April 23, 1870.

"In my last letter I described the common Blackbird of this country (*Molothrus bonariensis*), but omitted some interesting particulars, which I now furnish. I have found it most common in the vicinity of Buenos Ayres city, becoming rarer the further we go from it. It is fond of cultivated districts, but is oftener met with in open plains than in woods. Its eggs are not often found in the nests of birds that breed in wild forests—never in the nests of the Cuckoos and Thrushes.

"I have never seen it attack any bird to get into its nest, and believe its eggs are invariably laid in the absence of the true proprietor. The Tijereta (*Milvulus violentus*), that constantly attacks and beats off birds of prey, would not be easily driven off by a female Blackbird; and yet the Tijereta is the most imposed upon of any; while, on the other hand, the Blackbird's eggs are never found in the nests of some species that are not at all pugnacious, such as that, for example, of *Serpophaga nigricans*.

"A very remarkable circumstance is that the eggs of the Blackbird differ as much in form, size, and colour as its habits are irregular. Some are perfectly round, others oval, pointed, or elliptical. The commonest colours are pure white with very small pink spots thinly distributed, and reddish white thickly covered with brownish-red spots, the form of the spots on those darkly mottled being on different eggs round, oblong, and irregular.

"Can it be possible that an imperfection of the sexual organs, producing this diversity in the eggs, causes also that looseness in its breeding-habits which makes this species so different from others? According to Wilson, the *Molothrus pecoris* of the United States of North America lays but one egg in a nest, and lays its eggs all alike. The idea is perhaps fanciful, but has occurred to me, that all the birds I am acquainted with that build elaborate ingenious nests lay eggs

* See Mr. Hudson's previous letters:—No. I., P. Z. S. 1870, p. 87; II., ibid. p. 112; III., ibid. p. 158; IV., ibid. p. 332; V. and VI., ibid. p. 545.

perfectly alike; while the eggs of *Molothrus badius*, as well as those of *M. bonariensis*, show great diversity in size, shape, and markings, and there is a corresponding irregularity in the breeding-habits of the birds. But I will say no more on this subject now, as I desire to give you a fuller account of the *Molothrus badius*.

"This bird is here called '*Ala-canela*,' and by casual observers is frequently taken for the female of the *M. bonariensis*, resembling it much in size and colour; but it is a much prettier bird. It invariably goes in small flocks of about ten or fifteen individuals, and remains with us the whole year, but in the cold season travels about a great deal from place to place. It is fond of keeping about houses, if trees are near them, and is frequently seen clinging to and pecking fresh meat hung out of doors. Its language is varied; and it has different notes to call its companions, to express alarm, and when about to fly or sing. When flying it utters frequently a peculiarly long, loud, and melodious note, that may be heard half a mile off on still days. Its song is low, sweet, and varied; and all the individuals of the flock sing together.

"They have a pleasant habit in winter of gathering on the sunny side of a woodpen, outhouse, or other sheltered place, and singing often for an hour or more without ceasing.

"Few birds affect concealment and fear of man less than this species. It is seldom quiet, and never alone, sociability being its predominating trait. But in other species this quality, however strong, is during the breeding-season overcome by the more powerful attachment of the sexes; in the *Ala-canela*, as far as my observations extend, the first is almost, and often quite, as strong as the last; and this circumstance introduces no little confusion into its breeding-habits. It often happens that the flock does not break up in spring, and on such occasions they entertain a promiscuous sexual intercourse. Sometimes they pair and construct a nest of slender sticks lined with hair, rather high up in the smaller branches of a tree, and lay four or five mottled eggs. A pair of them will sometimes seize the nest of the Lerratero (*Anumbius acuticaudatus*), and either lay in it or build their own nest on the top of it.

"I once observed a pair of them incessantly fighting for several days with a couple of Lerrateros for the nest of the latter. After they had got possession of it, I found under the tree five dead half-fledged young Lerrateros, cast out by the merciless intruders: considering the narrow entrance and great depth of the nest, this could not have been an easy feat. Another time I observed a flock of eight or ten individuals take possession of a nest, and build one of their own on the top of it, though no larger than for a single pair. They appeared to live very amicably together; and after a few days I took fourteen eggs from the nest. The birds manifested great anxiety while I was in the tree; but the eggs were perfectly cold; probably more would have been laid. The erratic habits of this bird are very puzzling, and will, perhaps, afford a fertile theme to the pens of future naturalists.

"I once observed a pair of young *Ala-canelas* following a Yellow-

breast (*Leistes anticus*) from tree to tree clamouring for food; they were fed many times by their foster-mothers while I watched them.

"It is very probable that they occasionally deposit their eggs in the nests of other birds.

"I remain, very truly yours,

"WILLIAM H. HUDSON."

A communication was read from Mr. W. Vincent Legge, F.Z.S., containing notes on a bird of the Malurine group inhabiting Ceylon. Mr. Legge stated that the bird had the generic character of *Prinia*, but appeared different from *P. socialis*, the only species given as inhabiting Ceylon. A full description of the bird, its nest, and eggs were appended. The nest was stated to be a loosely made and careless structure, very different from that of *P. socialis*.

A communication was read from Professor W. Peters, F.M.Z.S., entitled "Contributions to the Knowledge of *Pectinator*, a genus of Rodent Mammalia from Eastern Africa." This memoir was based upon five specimens in spirits, one imperfect skeleton, and one skin of the *Pectinator spekii* obtained by Mr. W. Jesse, Zoologist to the Abyssinian Expedition, between Zoulla and Senafé. After describing the external characters, anatomy, and osteology of this animal, and discussing the opinions of preceding authorities, Dr. Peters arrived at the following conclusions on this subject:—

1. *Pectinator* differs from *Ctenodactylus* not only in the greater number of teeth and in its longer tail, but also in the different structure of the ears and of the skull.

2. The *Ctenodactyli* (*Ctenodactylus* and *Pectinator*) cannot be associated with the *Dipodes*, their affinity with the latter being not greater than that of the *Chinchillæ*, *Octodontes*, and *Echinomyes*.

3. They show in nearly every part of their structure their near relationship with the last-named groups, and deviate from them only in a very few points (the form of the hyoid bone, of the sacral and caudal vertebral column, of the development of the crest of the humerus and femur), in which, however, they do not show any inclination towards the *Dipodina*, but rather some affinity with the *Murina*.

4. They form a peculiar group of the *Hystricidæ*, as understood by Waterhouse, which in some points is more allied to the *Chinchillæ*, in other points to the *Octodontes*.

5. *Petromys* is not to be associated with the *Ctenodactyli*, but with the *Octodontes*.

This paper will be printed in full in the Society's 'Transactions.'

Prof. Newton, V.P., exhibited an example of the chick of the rare and remarkable wader *Anarhynchus frontalis*, Quoy and Gaimard, sent to him from New Zealand by Dr. Hector, F.R.S., who had

received it from Mr. Thomas H. Potts of Canterbury. The bird, though only a few days old, had its bill very distinctly bent to the right side, quite as much so in proportion to its size as the adult.



Bill of *Anarhynchus frontalis*, pullus. Natural size.

Prof. Newton remarked on the great increase in our amount of information respecting this very singular form within the last few years, chiefly owing to the pains taken in Europe by Mr. James Edmund Harting, F.Z.S. (Ibis, 1869, p. 304, pl. 8), and Dr. Hartlaub, F.M.Z.S. (P. Z. S. 1869, p. 433)—but most of all to the investigations in New Zealand carried on by Mr. Potts, who had had ample opportunities of studying the habits of the bird, and had contributed an interesting note respecting them to the 'Transactions and Proceedings of the New-Zealand Institute' (vol. ii. pp. 68, 69), besides a fuller account read before the Wellington Philosophical Society on the 25th of June last, which would, no doubt, appear in the same journal in due time. Of this last a copy had been obligingly sent to Prof. Newton by Dr. Hector.

The Secretary read a paper by Mr. W. Theobald, of the Geological Survey of India, containing "Observations on a Paper by Dr. J. E. Gray, entitled 'Notes on the Families and Genera of Tortoises' &c.," which had been communicated to the Society by Mr. W. T. Blanford, C.M.Z.S.

After some preliminary observations, in the course of which it was stated that the author's personal acquaintance with some of the specimens referred to in Dr. Gray's paper might be held to qualify him to make critical remarks on the subject, Mr. Theobald proceeded to treat of certain species of Tortoises mentioned in Dr. Gray's paper (P. Z. S. 1869, p. 165 *et seq.*) in the following order:—

1. TESTUDO INDICA (Gray, *l. c.* p. 168).

As regards this species, Mr. Theobald insisted that it was time that the error which, in his opinion, was conveyed by the trivial name *indica* as applied to this species should be abandoned in scientific works, since not a single species of the group containing *T. indica* (if the aberrant *T. phayrei*, Blyth, be excepted) was known to occur either in India proper or in Burmah.

2. TESTUDO (SCAPIA) FALCONERI (Gray, *l. c.* p. 169).

This species, Mr. Theobald observed, had been based by Dr. Gray upon a skull "received in Dr. Falconer's collection and presented to the British Museum by his brother on his death." The locality "India" given by Dr. Gray, Mr. Theobald considered must be incorrect, as the only species of *Testudo* inhabiting India proper was

T. stellata, of which *T. megalopus*, Blyth, was a synonym (*vide* J. A. S. B. xxxii. p. 83). In Burmah two other species occurred, *T. elongata*, Blyth, and *T. platynotus*, Blyth. The latter species was closely allied to *T. stellata* of India, and replaced it throughout the countries east of the Bay of Bengal. The third species of *Testudo* from Burmah was *T. phayrei*, Blyth (J. A. S. B. xxii. p. 639), of which Mr. Theobald considered *T. falconeri*, Gray, to be a mere synonym. An excellent description of this species had been given by Blyth (*l. c.*), founded on two stuffed specimens presented by Captain Phayre, the largest of which measured 20 inches in a straight line, or 22½ over the curve, the second specimen being slightly smaller, though more aged. In his 'Catalogue of the Reptiles in the Museum of the Asiatic Society of Bengal' Mr. Theobald had entered inadvertently the larger or type specimen of *T. phayrei* as "*T. indica*," whilst the smaller specimen (which was in a very dilapidated state) had been entered as *Manouria emys*. Both these mistakes Mr. Theobald attributed to his own culpable haste, as the type was easily recognizable, and had been at once detected by Dr. Anderson, the present curator. However, it required only a glance to see that Dr. Günther had erred in uniting *T. phayrei*, Blyth, with *Manouria*, inasmuch as, though *T. phayrei* possessed a divided caudal plate, yet its pectoral shields united to form a suture, as in true *Testudo*, and bore no resemblance to those plates in *Manouria*. The smaller and more aged specimen above alluded to had been originally stuffed, but when examined by Mr. Theobald was found to be in a very fragmentary condition. On inquiries being made how it had come into this state, Mr. Theobald had been informed that the specimen in question had been taken away by Dr. Falconer (when engaged in preparing his Catalogue of the Asiatic Society's Sewalik fossils) and buried, in order to separate the bones. The dermal plates were now consequently entirely separated from the skeleton, most of them, together with the skull and most of the limb-bones, being missing. The skeleton itself bore the names of the different bones written upon them in ink either by Dr. Falconer himself or by Dr. Walker, who had assisted him in the preparation of the above-named catalogue. As the skull in question had not, as it seemed, ever been restored to the Indian Museum through the inadvertence of Dr. Falconer when returning the rest of the specimen, it was but reasonable to conclude that it had remained in his possession, and had eventually thus passed into the British Museum. In default, therefore, of more exact information, Mr. Theobald held that the evidence before him pointed to the conclusion that the skull whereon *T. falconeri*, Gray, had been based was no other than the identical skull of *T. phayrei*, Blyth, missing from the Calcutta Museum.

3. TESTUDO ELONGATA, Blyth (Gray, *l. c.* p. 171).

This was the type of Dr. Gray's genus *Peltastes*, a name, as Dr. Stoliczka had pointed out to Mr. Theobald, preoccupied by Rossi in 1807 for a Hymenopteron, by Agassiz in 1838 for an Echino-

derm, and by Fischer in 1839 for an Orthopteron. The habitat of this species was given by Dr. Gray as "India," but should stand "from Arakan to Mergui" as already stated by Blyth (J. A. S. B. xxxii. p. 83).

4. CYCLEMYS ORBICULATA (Gray, *l. c.* p. 178).

Mr. Theobald repeated the observations made by him with regard to the synonymy and sternal suture of this species in Journ. Linn. Soc. Zool. vol. x. p. 12, 1869.

5. KACHUGA PEGUENSIS (Gray, *l. c.* p. 200).

The habitat of this species was given by Dr. Gray as "India;" but the specimen had probably come from Pegu. Mr. Theobald, however, could confidently say that he had brought home no heads of Tortoises from Pegu of which the "thorax" was "unknown;" and his impression was that this species had been founded on a skull (possibly aberrant) of either *Tetraonyx lessoni* or *Batagur trivittata*.

6. "KACHUGA TRILINEATA, Theobald" (Gray, *l. c.* p. 209).

Mr. Theobald denied that he had either named, described, or so much as admitted any *Kachuga trilineata*. The habitat was said to be "India;" but Mr. Theobald had brought home no skull of a three-streaked *Emys* from India, though he had brought some from Pegu. In 1867 Mr. Theobald had brought home specimens of two species of three-streaked *Emydes*, and had exhibited them to Dr. Gray at the British Museum. These were, according to Mr. Theobald's identification, *Emys duvaucelii*, Dum. & Bibr., from the Ganges, and *E. trivittata*, Dum. & Bibr., from the Irrawaddy; of the latter he had brought home many skulls, including that of a fine female now in the British Museum. This skull differed greatly from that of the male, which was a smaller and more finely coloured animal, and would therefore probably prove to be that upon which the species called *Kachuga trilineata* by Dr. Gray had been established.

7. KACHUGA OLDHAMI (Gray, *l. c.* p. 200).

This species, from Pegu, Mr. Theobald considered to be likewise very doubtful, being based on a skull only, upon the distinctness of which Mr. Theobald had no confidence whatever.

8. KACHUGA BERDMOREI, Blyth (Gray, *l. c.* p. 204).

Dr. Gray had rightly admitted this species (which had been wrongly identified by Dr. Günther with the very distinct *E. ocellata*, Dum. & Bibr.), but had left the habitat unknown, although it had not only been given by its describer, Mr. Blyth (J. A. S. B. xxvii. p. 281), but likewise by the author in his 'Catalogue of the Reptiles of Pegu' (p. 12), and although there were specimens of it in the British Museum both from Pegu and the Tenasserim provinces, where it was abundant. *E. ocellata*, of which Mr. Theobald believed there was no specimen in the British Museum, was strictly confined to the region of the Ganges, just as *E. berd-*

morei was to that of the Irrawaddy. The author finally repeated the statements, as regards the synonymy of this species, which he had published already in Journ. Linn. Soc. Zool. vol. x. p. 16, and in his Catalogue before referred to.

The following papers were read:—

1. On the Fishes of the Andaman Islands.

By Francis Day, F.Z.S. & F.L.S.

Having been directed by the Government of India to examine into and report upon the capabilities of the fisheries of the Andaman Islands, I propose detailing in the following paper the result of my investigations into the ichthyology of that penal settlement *.

These rocky islands are surrounded to a great extent by coral reefs, whilst the waters are beautifully clear, except during the stormy months of the year. The inquirer is consequently enabled with the greatest facility to perceive, even at considerable depths, the movements of the fishes, crustaceans, and other animals which inhabit those regions. Due most probably to this clearness of the water, the coloration of the fish is much more vivid than along the coasts of India; and other curious results appear to be consequent on the same cause.

Siluroids are very rare; the feelers useful in muddy waters do not appear to be here required; in fact, the only situations where they were at all common were up creeks and in brackish pieces of water. Sea-snakes seemed to be entirely absent.

In those inland portions of the islands investigated by us, the freshwater streams (except during the rainy seasons) are insignificant, whilst large natural tanks are unknown. The aborigines, however, assert that a fine freshwater lake exists a few days' journey inland in the South Andamans. As might be anticipated, the varieties of freshwater fishes are few.

The period of the year I was at the Andamans was from December 29th, 1869, to January 24th, 1870, during which brief stay I received every assistance from the officials in procuring all the various species of fish which could be captured. I likewise went for eight days' fishing with the aborigines, when I was accompanied by Mr. Homfray, their energetic protector, and was fortunate in procuring many species at this time which I did not otherwise obtain.

Even during my brief sojourn, I observed the apparent migration of one species of fish, the beautiful *Acanthurus lineatus*, Linn., which was abundant on my arrival, but could not be obtained at the period I left.

I have included a few species obtained at the Nicobars by a native collector, who was kindly lent to me for that purpose by Dr. Stoliczka.

* For an account of the aborigines of the Andamans, see the author's article, Trans. As. Soc. Beng. 1870.

Family PERCIDÆ.

1. LATES CALCARIFER, Bloch. *Jo-dah*, Andamanese.

Cæc. pyl. 3.

This species was apparently rare.

2. SERRANUS HEXAGONATUS, Forst.

Cæc. pyl. 32.

Common, and takes a bait very freely.

3. SERRANUS SUMMANA, Forsk.

A common species.

4. SERRANUS BONTOO, C. & V. *Rou-je-dah*, Andamanese.

Common, one specimen 24 inches long.

5. SERRANUS ARGUS, Schn.

Cæc. pyl. 8.

Usually found with the *S. hexagonatus*, and taken in the same way.

6. SERRANUS SUILLUS, C. & V. *Rāb-na-dah*, or *O-ro-tam-dah*, And.

Comparatively rare.

7. SERRANUS DISPAR, Playfair.

Very common.

8. SERRANUS GLAUCUS, sp. nov.

B. vii. D. 11/15. P. 17. V. 1/5. A. 3/8. C. 19. Cæc. pyl. 13–14.

Length of head $\frac{2}{7}$, of caudal $\frac{2}{11}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{4}$ diameter from end of snout, 1 diameter apart.

Preopercle serrated, having three strong denticulations at its angle.

Teeth villiform in jaws, vomer, and palate, with one or two canines on either side of the upper jaw.

Fins. Third dorsal spine rather the longest; second anal spine strongest, third slightly the longest; caudal lunated.

Colours greyish, becoming dirty white along the abdomen. Head and body rather closely covered with large yellow spots. Pectoral, dorsal, anal, and caudal also spotted. Dorsal, ventral, anal, and caudal with a black margin edged with white.

Hab. Andamans, where it is not uncommon.

9. SERRANUS HOMFRAYI, sp. nov.

B. vii. D. 9/14. P. 17. V. 1/5. A. 3/9. C. 15.

Length of head $\frac{1}{3}$, of caudal $\frac{2}{9}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter nearly $\frac{1}{4}$ of length of head, 1 diameter from end of snout.

Angle of preopercle slightly rounded and finely serrated.

Teeth villiform, canines small.

Fins. Last dorsal spine longest. The pectoral reaches to above the commencement of the anal. The second anal spine the longest, and much the strongest.

Colours. Whitish, and covered with roseate spots, well defined upon the head, and a few dark ones also along its upper surface. A moderately broad black band over the free portion of the tail, just behind the posterior margin of the dorsal fin, and extending laterally to one-third of its depth. Dorsal and anal fins spotted with red, having a broad margin of the same scarlet colour, edged with white. Caudal with more red than the dorsal or anal, and a very dark margin along its upper portion.

Hab. Port Blair. One specimen obtained, 6 inches in length.

I have named it after J. Homfray, Esq., of the Andamans, who greatly assisted me in my inquiries.

10. SERRANUS CYANOSTIGMATOIDES, Blkr.

Cæc. pyl. 16.

11. GRAMMISTES ORIENTALIS, Bl. Schn.

12. GENYOROGE MARGINATA, C. & V.

13. GENYOROGE CÆRULEOPUNCTATA, C. & V.

14. GENYOROGE AMBOINENSIS, Bleeker.

B. vii. D. 11/13. P. 17. V. 1/5. A. 3/8. C. 17. L. l. ca. 70. Cæc. pyl. 0.

The black lateral blotch in this species at the Andamans is a *post-mortem* appearance.

15. GENYOROGE GRAMMICA, sp. nov.

B. vii. D. 10/14. P. 17. V. 1/5. A. 3/7. C. 17. L. l. 45. Cæc. pyl. v.

Length of head $\frac{4}{13}$, of caudal $\frac{1}{5}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, 1 diameter apart.

Preopercle with a deep emargination, serrated on both vertical and horizontal margins, the latter being the coarsest. Interopercular knob well developed.

Teeth villiform, with very small canines in the upper jaw.

Fins. Dorsal spines moderately strong, the third to the sixth being the longest. Pectoral pointed, reaching to above the front margin of the anal. Second anal spine longest and strongest, its length nearly equalling that of the rays. Caudal lunated.

Colours. Yellow, with five blue lines on the body, the three upper going to the dorsal fin, the fourth to the middle of the caudal, and

the fifth to the end of the base of the anal. Four blue lines on the head: two from the eye join second and third body-lines; two from the snout become fourth and fifth on the body. A black finger-mark exists on and above the lateral line, opposite the commencement of the soft dorsal fin.

Hab. Andaman Islands, where it is not rare.

16. MESOPRION RUSSELLII, Blkr.

Cæc. pyl. 4–6.

17. MESOPRION DECUSSATUS, C. & V. *Jeu-win-dah*, And.

Cæc. pyl. 3.

This is identical with the species I described as *M. therapon*, as pointed out to me by Dr. Günther.

18. MESOPRION BLEEKERI, Günther.

19. MESOPRION RANGUS, C. & V. *To-go-re-dah*, And.

20. MESOPRION CHIRTAH, C. & V. *An-na-kah-ro-dah*, And.

Many of the young (*M. annularis*) were captured, and a few adults (*M. chirtah*).

21. MESOPRION SILLAOO, C. & V.

22. MESOPRION JOHNII, C. & V.

23. MESOPRION MULTIDENS, sp. nov.

B. vii. D. 10/11. P. 16. V. 1/5. A. 3/9. C. 15. L. l. 52. L. tr. 7/17. Cæc. pyl. 5.

Length of head $\frac{3}{4}$, of caudal $\frac{1}{4}$, height of body $\frac{1}{4}$ of the total length.

Eyes. Diameter nearly $\frac{1}{3}$ of length of head, 1 diameter from end of snout, $1\frac{1}{4}$ diameter apart.

The distance between the eye and the angle of the mouth equals that of three-fourths of the diameter of the orbit. Seven rows of scales exist between the eye and the angle of the preopercle, which is serrated along both vertical and horizontal margins. Preorbital two-thirds as high as the orbit. Maxilla reaches to below the anterior margin of the orbit.

Teeth. Six canines in the lower jaw, two large and some smaller ones in the upper jaw; villiform on vomer and palate.

Fins. Dorsal spines slender, the fifth the longest, and nearly one-half as long as the height of the body below it. Pectoral reaching to above the posterior margin of the base of the anal. Last dorsal and anal rays elongated. Ventral spine two-thirds as long as the first ray. Caudal deeply forked. Second anal spine strongest, third the longest.

Colours. Rosy, with about six longitudinal yellow bands along the body, and one golden one from the anterior inferior angle of the eye to the snout, and another across the forehead.

Hab. Andamans, where it is common, growing to a large size, and being highly esteemed as food.

24. AMBASSIS UROTÆNIA, Blkr.

L. l. 26. L. tr. 4/10.

Found at the Andamans and Nicobars.

25. AMBASSIS DUSSUMIERI, C. & V.

Taken in salt water.

26. AMBASSIS MACRACANTHUS, Blkr.

D. $7|\frac{1}{9}$. V. 1/5. A. 3/9. L. l. 27.

Length of head $\frac{3}{7}$, of caudal $\frac{3}{7}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{1}{5}$ of length of head, $\frac{1}{3}$ of a diameter from end of snout. Anterior margin of orbit serrated, two spines at its posterior superior angle; preorbital serrated. A double serrature at the preopercle. Subopercle with four teeth at its angle. The maxilla extends to below the anterior third of the orbit.

Teeth villiform.

Fins. Second dorsal spine one-half the length of the body; third anal spine the longest in that fin.

Lateral line ceases after a few scales.

Colours. Silvery, without any lateral stripe, except in preserved specimens. Second dorsal spine of a brilliant orange, the interspace between it and the third black.

Hab. Andamans, in the estuaries.

27. APOGON MULTITÆNIATUS, Blkr.

D. $6|\frac{1}{9}$. P. 15. V. 1/5. A. 2/8. C. 17. L. l. 28. L. tr. $2\frac{1}{2}/7\frac{1}{2}$.

Length of head $\frac{1}{3}$, of caudal $\frac{1}{4}$, height of body above $\frac{1}{4}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, 1 diameter from end of snout, $\frac{2}{3}$ of a diameter apart.

Lower limb of preopercle crenulated.

Teeth large and widely set; also villiform on vomer and palate.

Fins. Second dorsal spine not $\frac{1}{3}$ of height of body below it. Caudal forked.

Colours. Greyish, with nine dark brown longitudinal bands, three times as wide as the ground-colour, extending from the head nearly to the tail, which has a dark spot at its base. First dorsal black. Ventral nearly black, other fins red. Dorsal, caudal, and anal with dark margins.

28. APOGON HYALOSOMA, Blkr.

D. $6|\frac{1}{9}$. P. 15. V. 1/5. A. 2/8. C. 17. L. l. 24. L. tr. $2\frac{1}{2}/8\frac{1}{2}$.

Very common. Specimens captured up to 6 inches in length.

29. APOGON ORBICULARIS, Kuhl & V. Hasselt.

D. $6|\frac{1}{8}$. P. 12. V. 1/5. A. 2/9. C. 17. L. l. 25. L. tr. 3/7.

Colours. Olive; a dark zone round the body in front of the first

dorsal fin. Head spotted with black. A cloudy band below the second dorsal. Free portion of tail, anterior to the base of the fin, spotted. First dorsal spotted with black; base of second dorsal cloudy. Ventrals nearly black.

30. APOGON FASCIATUS, White.

Andamans and Nicobars.

31. APOGON CHRYSOTÆNIA, Blkr.?

D. $7|\frac{1}{9}$. P. 17. V. 1/5. A. 2/8. C. 17. L. l. 26. L. tr. 6/8.

Length of head $\frac{1}{4}$, of caudal $\frac{2}{9}$, height of body $\frac{1}{4}$ of the total length.

Eyes. Diameter $\frac{2}{9}$ of length of head, $\frac{1}{2}$ a diameter from end of snout.

Third dorsal spine longest.

Colours. Brilliant golden, with a black head. A silvery-white median band exists along the top of the head, which divides, one branch proceeding along the back on either side to the upper half of the tail; a second goes from above the orbit to the middle of the tail, a third through the orbit to the lower half of the tail, and a fourth from the angle of the mouth to below the base of the pectoral. Fins orange.

This fish is very common amongst the coral-reefs on the Andaman Islands. As soon as the water is splashed they all rush to the coral, concealing themselves amongst its sticks, probably afraid that a large fish is coming to devour them. It is also found at the Nicobars.

32. APOGONICHTHYS AURITUS, C. & V.

B. vii. D. $7|\frac{1}{9}$. A. 2/7. L. l. 23.

Length of head $\frac{1}{3}$, of caudal $\frac{2}{9}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, $\frac{1}{2}$ a diameter from end of snout.

Opercles entire. Maxilla reaches to slightly behind the posterior margin of the orbit.

Teeth villiform on jaws, vomer, and palate.

Fins. Caudal rounded. Third dorsal spine the longest. Lateral line ceases under the middle of the soft dorsal fin.

Colours. Body and head spotted and marbled all over with brown. A round black spot on the opercles having a white lower edging.

Hab. Andamans and Nicobars.

33. CHEILODIPTERUS QUINQUELINEATUS, C. & V.

D. $6|\frac{1}{9}$. P. 15. V. 1/5. A. 2/9. L. l. 25.

Colours. Five black bands along the sides. A black spot at the root of the caudal, with a bright yellow ocellus around it.

Hab. Nicobars.

34. DULES TÆNIURUS, C. & V.

Family PRISTIPOMATIDÆ.

35. THERAPON SERVUS, Bloch.

36. THERAPON THERAPS, Cuv. & Val.

37. PRISTIPOMA HASTA, Bl. *Oo-rug-nud-dah*, or *Koor-koo-to-dah*, And.

38. PRISTIPOMA MACULATUM, Bl. *Oor-ung-dah*, And.

39. PRISTIPOMA ARGYREUM, Cuv. & Val.

D. 12/13. V. 1/5. A. 3/7. L. l. 45.

Length of head $\frac{1}{3}$, of caudal $\frac{2}{3}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, $\frac{1}{2}$ a diameter from end of snout.

Angle of preopercle slightly produced, and more coarsely serrated than the other portion.

Fins. Third dorsal spine longest, being $\frac{2}{3}$ of height of body. Second anal spine strong, its length equal to that of the first ray. Caudal cut square.

Colours. Silvery; a dark blotch on opercle. Membrane of first dorsal fin darkish.

40. DIAGRAMMA NIGRUM, Cuv. & Val.

41. DIAGRAMMA PUNCTATUM, Cuv. & Val.

B. vi. D. 9/25. P. 17. V. 1/5. A. 3/7. C. 17. L. l. 65.

In examining the Andamanese with the Red-Sea specimen in the British Museum, the differences were but slight.

42. LOBOTES SURINAMENSIS, Bl. *Bur-dă-lah*, or *Ar-aig-dah*, And.

Cæc. pyl. 4.

Not common.

43. SCOLOPSIS CILIATUS, Lacép.

Cæc. pyl. 5.

Colours. Greenish olive, becoming lighter on the abdomen. A silvery-white line extends from between the lateral line to the commencement of the soft dorsal. Scales below the lateral line have a golden central spot. Fins reddish.

Three specimens up to $7\frac{1}{2}$ inches in length.

44. SCOLOPSIS BILINEATUS, Bl.

B. v. D. 10/9. P. 17. V. 1/5. A. 3/7. C. 17. L. l. 46. L. tr. 4/15. Cæc. pyl. 5.

45. SCOLOPSIS CANCELLATUS, Cuv. & Val.

The foregoing three species of this genus took a bait very readily.

46. DENTEX (SYNAGRIS) NOTATUS, sp. nov.

D. 10/9. P. 15. V. 1/5. A. 3/7. C. 17. L. l. 48. L. tr. 3/10.

Length of head above $\frac{1}{4}$, of caudal above $\frac{1}{5}$, height of body above $\frac{1}{4}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of the length of head, 1 diameter from the end of snout and apart.

Preopercle crenulated. Three rows of scales on the cheeks; lower limb of preopercle scaleless. Preorbital higher than the eye.

Teeth. Four canines in the upper, and six in the lower jaw.

Fins. Fifth and sixth dorsal spines the longest, and nearly one-third as long as the head. Third anal spine longest, and intermediate in length between the second and the first ray. Caudal forked, upper lobe the longest, the fin covered with small scales.

Colours. Rosy, with a dark brilliant spot on the first five scales below the lateral line, the upper half red, the lower bright yellow. Five or six yellow longitudinal bands below the lateral line, and three silvery-white ones. A broad purplish band below the eye leading to the shoulder-mark. A yellow band along the base of the dorsal and anal fins.

Hab. Andamans. Only one specimen captured.

Family SCIÆNIDÆ.

47. CORVINA BELENGERI, Cuv. & Val.

48. OTOLITHUS ANEUS, Bloch. *Chal-burn-dah*, And.

Family SPARIDÆ.

49. LETHRINUS HARAK, Forsk. *Po-tang-dah*, And.

Several specimens were obtained by the Andamanese, who shot them with their arrows.

50. LETHRINUS XANTHOTÆNIA, Blkr.

51. CHRYSOPHRYS CALAMARA, C. & V. *Moo-roo-kee-dah*, And.

52. PIMELEPTERUS CINERASCENS, Forsk.

Common.

Family POLYNEMIDÆ.

53. POLYNEMUS TETRADACTYLUS, Shaw. *To-bro-dah*, And.

Not common.

Family MULLIDÆ.

54. UPENEUS BARBERINUS, Lacép.

Common.

55. UPENEUS SPILURUS, Bleeker.

Eyes. Diameter $\frac{1}{3}$ of length of head, $3\frac{1}{2}$ diameters from end of snout. Interorbital space convex.

Scales ctenoid.

56. UPENEUS INDICUS, Shaw.

57. UPENEOIDES TRAGULA, Richardson.

Cæc. pyl. 6.

Barbels of a brilliant orange-colour. A dark streak along the sides, which are spotted. Both caudal lobes barred.

58. UPENEOIDES BIVITTATUS, C. & V. *Chah-ti-ing-ud-dah*, And.

59. MULLOIDES FLAVOLINEATUS, Lacép.

Family NANDIDÆ.

60. PLESIOPS CORALLICOLA, Bleeker.

Colours brownish, each scale with a blue centre. Opercles with a large black ocellus.
Andamans and Nicobars.

Family ATHERINIDÆ.

61. ATHERINA FORSKÅLII, C. & V. *Ko-re-dah*, And.

Very numerous.

Family MUGILIDÆ.

62. MUGIL MACROCHILUS, Blkr.

The Andamanese procured large numbers of these Mullets, shooting them with bows and arrows. They are more esteemed as food than any other description of fish.

63. MUGIL WAIGIENSIS, C. & V. *Do-dah*, And.

Not uncommon.

64. MUGIL BONTAH, Cuv. & Val. *Pa-lă-ke-dah*, And.

Seven long cæcal appendages.

65. MUGIL SUNDANENSIS, Q. & G.

66. MUGIL CÆRULEO-MACULATUS?, Bleeker.

These specimens agree with Bleeker's description, except that the pectoral fin is not quite so long as the head, instead of being somewhat longer.

Family TRACHINIDÆ*.

67. PERCIS HEXOPHTHALMA, Ehrn.

D. 5/21. P. 17. V. 1/5. A. 17. C. 15. L. l. 62. L. tr. 8/21. Cæc. pyl. 3.

A beautiful specimen, 8 inches long, was taken at Port Blair.

* A specimen apparently of the *Pseudoplesiops typus*, Bleeker, placed by myself in the British Museum, differs from the original description, its ventrals being thoracic and not jugular.

68. SILLAGO SIHAMA, Forsk. *Thol-o-dak*, And.

Cæc. pyl. 4.

69. PSEUDOCHROMIS XANTHOCHIR, Bleeker.

L. l. 45.

Family CIRRHITIDÆ.

70. CIRRHITES FORSTERI, Bl. Schn.

Only one specimen was captured.

Family SCORPÆNIDÆ.

71. PTEROIS VOLITANS, Linn. *Cheeb-ta-ta-dak*, And.

This fish is much dreaded, on account of the severe nature of the wounds inflicted by its spines.

Family COTTIDÆ.

72. APISTUS (PROSOPODASYS) NIGER, C. & V. *Pom-tho-cho-rogue-dak*, And.

Wounds from the spines of this fish are likewise greatly feared.

73. PLATYCEPHALUS NEGLECTUS, Trosc.

74. PLATYCEPHALUS INSIDIATOR, Forsk. *A-ra-wud-dak*, or *Chou-ur-dak*, And.

Family BERYCIDÆ.

75. HOLOCENTRUM ANDAMANENSE, sp. nov.

B. viii. D. 11/14. P. 17. V. 1/7. A. 4/9. C. 21. L. l. 42. L. tr. 3/7½.

Length of head nearly ⅓ ($\frac{4}{13}$), of caudal ⅛, height of body nearly ⅓ ($\frac{4}{13}$) of the total length.

Eyes. Diameter ⅔ of length of head, 1 diameter from end of snout, ⅔ of a diameter apart.

Jaws of equal length, vertical and horizontal margins of preopercle rather finely serrated, having a long smooth spine at the angle, the length of which equals that of the diameter of the eye. Opercle with two flat spines, the upper being the longest, and twenty-nine denticulations below; sub- and interopercles serrated. Preorbital with a strong spine descending downwards. Posterior process of intermaxillaries extends backwards to opposite the anterior third of the orbit; the maxilla extends to below the same spot. Shoulder-scale serrated.

Teeth villiform.

Fins. The third to the fifth dorsal spines the longest. Ventrals do not reach nearly to the anus. Third anal spine long and strong, equalling one-sixth of the total length. Caudal forked, lobes of equal extent.

Scales serrated posteriorly, and holes like pin-marks all over them.
Colours. Uniform rosy scarlet.
Length of specimen 8 inches.
Hab. Port Blair.

Family Squamipinnes*.

76. Chætodon vagabundus, Linn. *Pah-noo-dah*, And.

77. Chætodon pictus, Forsk.

78. Chætodon plebejus, Gmel.

D. 14/17. A. 4/16. L. l. 50.

Colours. Yellow. Ocular band black, with a white edge. Ocellus at base of caudal black, with a white margin.

79. Chætodon dizoster, C. & V.

This species was from the Nicobars.

80. Heniochus macrolepidotus, C. & V. *Pah-no-dah*, And.

81. Scatophagus argus, Linn. *Po-ra-dah*, And.

Cæc. pylori 18.

82. Ephippus orbis, Bl. *Kol-lid-dah*, And.

Cæc. pylori 4.

83. Drepane punctata, Linn. *Gun-na-to-dah*, And.

84. Toxotes jaculator, Pall. *Chá-ra-wud-dah*, And.

One specimen was 9 inches in length.

Family Teuthidæ.

85. Teuthis virgata, C. & V. *Tah-meer-dah*, And.

D. 13/10. P. 15. A. 7/9. C. 17.

Colours. Upper two-thirds of body coppery yellow, covered with

* I obtained some specimens at Madras, $1\frac{1}{16}$ inch long, of a fish which appears to me to belong to the genus termed *Tholichthys* by Dr. Günther, but which seems to be the young form of a genus of this family. I have placed one, however, in the British Museum as *T. osseus*.

D. 12/25. P. 15. V. 1/5. A. 3/19. C. 17. L. l. 41.

Length of head nearly $\frac{1}{3}$, of caudal $\frac{1}{5}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, 1 diameter apart.

Mouth small. Suprascapular considerably dilated; preopercular angle enlarged, reaching to the ventral fin. Suborbital ring enlarged, descending as low as the gill-opening, and its lower edge with five denticulations.

Lateral line ceases opposite to the middle of the soft dorsal.

Scales ctenoid, none on the head.

Fins. Dorsal notched, third spine the longest. Second anal spine longest and strongest. Ventrals rounded. Caudal cut square.

I cannot resist considering this to be one of the *Squamipinnes*, probably a young *Chætodon* or *Holocanthus*, and, I believe, a *Tholichthys* of a more adult age than Dr. Günther's types.

round blue spots, and having blue lines on the head. A brown band as wide as the orbit extends from before the dorsal fin, through the eye, to below the jaws, a second from sixth and seventh spines to base of pectoral fin, whilst both are edged with blue. Fins yellowish.

86. TEUTHIS VERMICULATA, C. & V. *Chow-lud-dah*, And.

87. TEUTHIS CONCATENATA, C. & V. *Thar-oar-dah*, And.

Colours. Dark greyish brown, covered all over with light orange spots larger than the interspaces, but decreasing in size towards the abdomen. A blue band extends from below the orbit to the angle of the mouth, whilst another passes along the preopercle.

88. TEUTHIS MARMORATA, Q. & G.

89. TEUTHIS JAVA, Linn. *Thar-oar-dah*, And.

90. TEUTHIS LABYRINTHOIDES, Bleeker.

91. TEUTHIS ALBOPUNCTATA, Schleg.?

The spots in this species were blue.

Family ACRONURIDÆ.

92. ACANTHURUS CTENODON, Cuv. & Val.

D. 8/29. A. 3/26.

Colours. Lineated all over with blue and yellow lines, the latter somewhat the widest. Numerous red spots about the head, more especially around the eyes. Dorsal and anal fins lineated.

Several specimens taken up to 8 inches in length.

93. ACANTHURUS TRIOSTEGUS, Linn.

Many specimens obtained up to $5\frac{1}{2}$ inches.

94. ACANTHURUS LINEATUS, Linn.

The coloration in Bennet's 'Fishes of Ceylon' very correctly represents this species, of which many were taken up to 10 inches in length.

95. ACANTHURUS ANNULARIS, Cuv. & Val.

Large specimens of this fish were obtained, which induces me to believe that Cuvier was correct in considering it a distinct species, and not the young of *A. java*, which latter form was not taken.

Family CARANGIDÆ.

96. CARANX HIPPOS, Linn.

An apparent variety of this species was covered with scattered black spots over the upper half of its body and its sides.

97. CARANX MELAMPYGUS, Cuv. & Val.

98. CARANX BLOCHII, Cuv. & Val.

99. CARANX CALLA, Cuv. & Val.

100. CARANX DJEDDABA, Forsk.

101. CARANX MATE, Cuv. & Val.

Colours. Deep slate-colour, silvery below. A well-defined opercular spot. Axil not black.

102. CARANX COMPRESSUS, sp. nov.

D. $8|\frac{1}{22}$. P. 21. V. 1/5. A. $2|\frac{1}{19}$. C. 21. L. l. 13.

Length of head $\frac{1}{4}$, of caudal $\frac{1}{5}$, height of body $\frac{2}{5}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, and 1 diameter apart.

Body oblong, compressed, equally convex along both profiles. Occipital crest well developed.

The posterior extremity of the maxilla extends to below the anterior edge of the orbit.

Teeth. Villiform in the upper jaw, and in a narrow band in the lower jaw; also present on vomer, palate, and tongue.

Fins. Pectoral elongated and falciform, reaching to above the ninth anal ray. Dorsal rays, first two elongated, decreasing as far as the twelfth. First three anal rays likewise somewhat elongated.

Scales present on the chest.

Lateral line forms a slight curve anteriorly, ending opposite to the tenth dorsal ray; it is strongly raised on the free portion of the tail, where only plates exist.

Colours. Silvery. A small black opercular spot. A black band along the vertical margin of the preopercle.

Hab. Andamans.

103. CARANX CILIARIS, Bl.

104. CARANX SPECIOSUS, Forsk.

105. CARANX OBLONGUS, Cuv. & Val. *Ro-thul-dah*, And.

106. CHORINEMUS TALA, Cuv. & Val.

107. CHORINEMUS LYSAN, Forsk.

108. CHORINEMUS TOOLOO, Cuv. & Val.

A large specimen was taken absolutely covered with parasites.

109. TRACHYNOTUS OVATUS, Linn.

110. PSETTUS ARGENTEUS, Linn. *Oo-chra-dah*, And.

111. EQUULA FASCIATA, Bl.

112. EQUULA DUSSUMIERI, Cuv. & Val.

113. EQUULA RIVULATA, Schleg.

114. EQUULA GERROIDES, Bleeker.

115. EQUULA SPLENDENS, Cuv. & Val.

116. GAZZA EQUULÆFORMIS, Rüpp.

Two small specimens were captured.

117. PLATAX VESPERTILIO, Bl.

Copper-coloured, having a brown ocular band reticulated with black. Pectoral and caudal white, except their bases, which are brown. Ventral with dark edges.

Specimens up to 3½ inches in length.

118. PLATAX TEIRA, Bl.

Family SCOMBRIDÆ*.

119. SCOMBER REANI, sp. nov.

B. vi. D. 6|$\frac{1}{12}$, v. P. 19. V. 1/5. A. 1/11. C. 19. Vert. 9/22.

Length of head ¼, of caudal ⅛, height of body ¼ of the total length.

Eyes with wide adipose margins. Diameter ⅓ of the length of head, 1 diameter from end of snout, 1½ diameter apart.

The maxilla extends to opposite the posterior margin of the orbit. Snout pointed; opercles scaly.

Fins. A groove along the base of the first dorsal fin, extending halfway to the base of the second dorsal. Caudal deeply forked, a keel along either side of its base.

Air-bladder present.

Cæca pylori numerous.

Colours. Back bluish green, becoming silvery white along the abdomen. A darkish longitudinal band along the lateral line, three above it, and two yellow ones below it.

Hab. Andamans, where it is very common up to 12 inches in length. It is said to refuse all baits.

* CUBICEPS INDICUS, sp. nov.

D. 10|$\frac{1}{14}$. P. 22. V. 1/5. A. 3/15. C. 15. L. l. 33.

Length of head nearly ⅛ ($\frac{3}{170}$), of caudal $\frac{3}{13}$, height of body nearly ⅓ ($\frac{6}{17}$) of the total length.

Eyes. Diameter ⅔ of length of head, ½ a diameter from end of snout, nearly 1 diameter apart.

Body compressed. Snout rather obtuse. Maxilla extends to below the anterior margin of the orbit. Preopercle crenulated.

Teeth in a fine single row in either jaw.

Fins. Dorsal spines feeble. Pectoral not elongated, its length being rather less than that of the head. Caudal slightly emarginate.

Scales cycloid.

Lateral line consisting of small scales in upper fourth of body.

Colours silvery.

Hab. Several specimens up to 3 inches long were taken at Madras along with the species of *Tholichthys* (?) previously adverted to. I have placed one in the British Museum.

120. SCOMBER KANAGURTA, Cuv. & Val. *Look-wa-dah*, And.

Not so numerous as the last species.

121. ECHENEIS REMORA, Linn.

122. STROMATEUS NIGER, Bl. *Ko-lig-dah*, And.

This fish is rare at the Andamans. On showing one to a convict employed on the fisheries, he stated it was the first that he had seen.

Family GOBIIDÆ.

123. GOBIUS GIURIS, Ham. Buch. *Poo-dah*, And.

Small specimens were taken in the fresh and brackish waters.

124. GOBIUS ALBOPUNCTATUS, Cuv. & Val.

125. GOBIUS ACUTIPINNIS, C. & V. *Mang-moo-goo-da-lah-dah*, And.

126. GOBIUS VIRIDIPUNCTATUS, Cuv. & Val.

127. GOBIUS ORNATUS, sp. nov.

D. $6|\frac{1}{10}$. P. 21. V. 1/5. A. 11. C. 13. L. l. 26. L. tr. 9.

Length of head $\frac{1}{4}$, of caudal $\frac{1}{5}$, height of body $\frac{1}{5}$ of the total length.

Eyes. Diameter $\frac{1}{3}$ of length of head, 1 diameter from end of snout, $\frac{1}{3}$ of a diameter apart.

Body elongated and compressed; snout obtuse. Head rather broader than high. Jaws of equal length, the posterior extremity of the maxilla extending to below the anterior margin of the orbit.

Fins. Pectoral extends to opposite the end of the ventral, its eight upper rays are silk-like. First dorsal much lower than the second, the posterior rays of which reach the caudal fin. Anal of the same character as the second dorsal. Caudal rounded, central rays somewhat the longest.

Scales in parallel rows; seven between the second dorsal and anal fins. They extend anteriorly as far as the orbit; none on cheeks and opercles.

Colours. Light brown, with three or four horizontal rows of black oblong blotches along the sides, and some fine yellow dots in the centre of some of the scales. Dorsal fin with three black bars or blotches. Second dorsal and anal with many small dots.

Hab. Andamans.

128. GOBIUS ANDAMANENSIS, sp. nov.

B. iv. D. $6|\frac{1}{10}$. P. 17. V. 1/5. A. 10. C. 11. L. l. 26–29.

Length of head $\frac{2}{7}$, of caudal nearly $\frac{1}{3}$, height of body $\frac{2}{9}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, $\frac{2}{4}$ of a diameter apart.

Upper profile of head rounded, a great rise from the mouth to opposite the upper margin of the orbit; head two-thirds as wide as long.

The posterior margin of the maxilla extends to under the middle third of the orbit.

Teeth villiform; small canines.

Fins. All the dorsal spines flexible and elongated, the first three being the longest. The posterior rays of the second dorsal prolonged, reaching beyond the base of the caudal, which latter is pointed. Posterior anal rays resemble the posterior dorsal ones. Pectoral reaches to beyond the front margin of the anal; the ventral does not extend so far.

Scales ctenoid, nine rows between the commencement of the second dorsal and anal, none before or between the orbits; they are smallest near the nape.

Colours. Olive, spotted all over with rusty. Rays yellow, barred and dotted with purplish red, which, however, in the anal are placed transversely, whilst it has a yellow margin.

Hab. Brackish waters in the Andamans.

129. GOBIUS GOBIODON, Day.

130. GOBIUS STOLICZKÆ, sp. nov.

D. 6/11. P. 15. V. 1/5. A. 11. C. 15. L. l. 48.

Length of head $\frac{1}{4}$, of caudal $\frac{1}{4}$, height of body $\frac{1}{5}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, 2 diameters from end of snout, 1 diameter apart.

Head broader than high, and longer than broad. Snout rather long, and a considerable rise from it to the orbits, which are near the summit of the head; upper jaw longest.

Teeth. Canines absent.

Fins. First dorsal somewhat lower than the second. Caudal cut square. Upper pectoral rays silk-like, the base of the fin not fleshy; the fin reaches to above the commencement of the anal. Membrane of ventral fin well developed.

Scales strongly ctenoid, slightly smaller on the nape than on the body. Fourteen rows between the second dorsal and the anal fins. Cheeks and opercles scaled.

Colours. Olive, marbled with darker. Head spotted with black and marked with short black lines. Both dorsals spotted. A jet-black mark at the posterior portion of the first dorsal fin. Caudal barred. A black mark at the upper part of the base of the pectoral.

Hab. Andamans, in brackish water.

This species is allied to *G. grammepomus*, in which latter, however, the head is scaleless, and the lower jaw somewhat the longest.

I have named it after my esteemed friend Dr. Stoliczka.

131. APOCRYPTES LANCEOLATA, Bl.

132. APOCRYPTES MACROLEPIS, Blkr.

133. APOCRYPTES CANTORIS, sp. nov.

D. 6/27. P. 19. A. 26. C. 17.

Height of body $\frac{1}{6}$, length of caudal $\frac{2}{9}$, of head $\frac{2}{9}$ of total length.

Eyes situated in second fifth of the head, $\frac{2}{3}$ of a diameter apart.

The maxilla extends to below the middle of the orbit.

Teeth. The anterior in the upper jaw enlarged, whilst those in the lower jaw are horizontal. A pair of canines at the symphysis.

Fins. Ventral disk not adherent to the abdomen. First dorsal some distance from the second; its first three rays rather elongated. Second dorsal with only a notch between it and the caudal, which latter is pointed. Base of pectoral rather fleshy.

Scales very minute, most visible in the posterior part of the body.

Colours. Olive. First dorsal dark, with three black bands along it. The upper portion of the caudal dark and spotted. Cheeks and under surface of the head with black spots.

134. EUCTENOGOBIUS ANDAMANENSIS, sp. nov.

B. iv. D. 6|13. P. 15. V. 6. A. 13. C. 15. L. r. about 60.

Length of head $\frac{1}{5}$, of caudal $\frac{2}{7}$, height of body $\frac{1}{5}$ of the total length.

Eyes rather elevated. Diameter $\frac{1}{5}$ of length of head, $1\frac{1}{2}$ diameter from end of snout.

Cleft of mouth oblique. The posterior extremity of the maxilla extends to beneath the middle of the orbit. A longitudinal crest on the nape leads towards the commencement of the dorsal fin.

Teeth conical and fixed, in a single row in the jaws; fine canines in the lower jaw.

Anal papilla present.

Scales largest posteriorly.

Fins. Pectoral pointed, and reaching to above the commencement of the anal. Dorsal spines flexible and elongated. Caudal pointed. Ventrals not adherent to the abdomen. A notch between the two dorsal fins.

Colours. Dark green, with a dark mark at the base of the caudal. Fins darkish.

Length of the longest of the three specimens captured 4 inches.

Hab. Andamans, in brackish water.

135. PERIOPHTHALMUS KŒLREUTERI, Schn. *Chood-mud-dah*, And.

136. BOLEOPHTHALMUS BODDAERTI, Pall.

137. ELEOTRIS SINENSIS, Lacép.* *Lee-mee-jo-do-dah*, And.

On opening a specimen $4\frac{1}{2}$ inches long, its stomach was found to be full of small crabs. This species lives in brackish water.

* In the 'Proceedings' of this Society for 1869, p. 517, I made a few short remarks upon *Eleotris scintillans*, Blyth, observing its apparent analogy to the *Eleotris ophiocephalus*, C. & V., or *E. cantoris*, Günther, but not redescribing

138. ELEOTRIS FUSCA, Bl.

139. ELEOTRIS CAPERATA, Cantor.

D. 6|$\frac{1}{8}$. P. 21. V.$\frac{1}{5}$. A.$\frac{1}{8}$. L. l. 30.

Length of head $\frac{2}{7}$, of caudal $\frac{2}{11}$, height of body $\frac{2}{9}$ of the total length.

Eyes. 1 diameter from end of snout.

Supraorbital margin serrated, likewise a serrated ridge on either side of the posterior limb of the intermaxillary.

Teeth villiform, outer row rather the largest.

Fins. Upper pectoral rays silk-like. Dorsal and anal rays rather produced. Central caudal rays the longest.

Scales ctenoid, nine rows between second dorsal and anal.

140. ELEOTRIS OPHIOCEPHALUS, C. & V. *A-rig-dah*, or *Mu-took-dah*, And.

D. 6|$\frac{1}{8-9}$. P. 16. V. 1/5. A.$\frac{1}{7}$. C. 15. L. l. 35. Cæc. pyl. 2.

This species is very common in the brackish and fresh waters of the Andamans. I had a very fine specimen, 9½ inches long, collected for me by Lieut. Protheroe, and which I have placed in the British Museum. Its appearance is very like that of an *Ophiocephalus*; whilst what is more remarkable is that both have two cæcal appendages.

141. AMBLYOPUS HERMANNIANUS, Lacép.

142. GOBIODON QUINQUESTRIGATUS.

Family OPHIOCEPHALIDÆ.

143. OPHIOCEPHALUS GACHUA, H. B. *Chad-dah*, And.

Family BLENNIIDÆ.

144. SALARIAS FASCIATUS, Bl. *Cha-la-ta*, And.

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the species, the type being too damaged for that purpose. However, since then I have obtained at Akyab a fine specimen 3 inches long.

D. 6|$\frac{1}{8}$. P. 15. A. 8. C. 13. L. l. 47.

Length of head nearly ¼ ($\frac{4}{17}$), of caudal ⅛, height of body ⅛ of the total length.

Eyes. Diameter ¼ of length of head, 1¼ diameter from end of snout and apart.

Head rather obtuse, superiorly flattened; lower jaw longest. Cleft of mouth extends to below the posterior third of the orbit.

Teeth in villiform bands, with the outer row in the lower jaw somewhat enlarged.

Scales ctenoid, those on the upper surface of the head and chest smaller than those on the body. The rows are irregularly arranged; there are thirty-four between the snout and the base of the first dorsal, they extend to before the eyes; there are fifteen rows between the second dorsal and anal.

Colours. Brownish; dorsal, caudal, and anal spotted all over, their edges white.

145. SALARIAS FUSCUS, Rüpp.

Nicobars.

146. SALARIAS BELLUS, Günther.

147. SALARIAS LINEATUS, Blkr.

148. SALARIAS DUSSUMIERI, Cuv. & Val.

149. ANDAMIA EXPANSA, Blyth.

Andamans and Nicobars.

Family SPHYRÆNIDÆ.

150. SPHYRÆNA JELLO, C. & V. *Thal-lib-dah*, And.

Family TRICHIURIDÆ.

151. TRICHIURUS HAUMELA, Forsk. *Pa-pa-dah*, And.

152. TRICHIURUS SAVALA, Cuv. & Val.

Family FISTULARIDÆ.

153. FISTULARIA SERRATA, Bl.

This fish appears to delight in living in the mud.

Order ACANTHOPTERYGII PHARYNGOGNATHI.

Family POMACENTRIDÆ.

154. AMPHIPRION BIFASCIATUS, Bloch.

This species was captured in the same localities as the next.

155. AMPHIPRION PERCULA, Lacép. *Eá-ole-jo-do-dah*, And.

The literal translation of the Andamanese name is Turtle's stomach. It is generally to be found alive and well inside large specimens of *Actiniæ*, which latter are supposed to be the stomachs of turtles.

156. AMPHIPRION AKALLOPISUS, Bleeker.

157. AMPHIPRION EPHIPPIUM, Bloch.

Andamans and Nicobars.

I possess a fine series of this species, leading up from the immature *Amphiprion tricolor* of Günther, with its pearl-coloured band, to the adult *A. ephippium*, in which the band has become completely obsolete. In this series there are the whole of the intermediate colorations.

158. DASCYLLUS ARUANUS, Linn.

159. POMACENTRUS BIFASCIATUS, Bleeker.

160. POMACENTRUS TRIMACULATUS, Cuv. & Val.

161. POMACENTRUS TRILINEATUS, Cuv. & Val.

Nicobars.

162. POMACENTRUS PUNCTATUS, Q. & G.

163. POMACENTRUS BANKANENSIS, Bleeker.

Andamans and Nicobars.

164. GLYPHIDODON SORDIDUS, Forsk. *Chák-mud-dak*, And.

This fish was very common, and frequently shot by the Andamanese.

165. GLYPHIDODON COCHINENSIS, Day.

166. GLYPHIDODON AFFINIS, Günther.

167. GLYPHIDODON BENGALIENSIS, Cuv. & Val.

168. GLYPHIDODON ANABATOIDES, Blkr.

D. $\frac{11-12}{10}$. P. 15. V. 1/5. A. 2/10. C. 17. L. l. 26. L. tr. $\frac{2\frac{1}{2}}{9}$.

Length of head $\frac{1}{4}$, of caudal $\frac{1}{4}$, height of body $\frac{2}{5}$ of the total length.
Eyes $\frac{1}{2}$ a diameter from end of snout.
Width of preorbital $\frac{1}{3}$ of that of orbit; suborbitals very narrow.
Colours. Olive; each scale on the head, along the back, and on the upper half of the sides with a brilliant green-blue centre. Pectoral with a black spot superiorly.
Lives around the coral, hiding itself amongst its branches when in fear.

169. GLYPHIDODON ANTJERIUS, Cuv. & Val.

170. GLYPHIDODON MODESTUS, Schleg.

171. GLYPHIDODON BATJANENSIS, Blkr.

D. 12/15. A. 2/13.

Family LABRIDÆ.

172. CHŒROPS ANCHORAGO, Bl.

Colours. Yellow; cheeks with large scarlet spots. A black vertical band extends from the interspace between the fourth dorsal spine and sixth dorsal ray to the middle of the body, divided anteriorly from another by a whitish ground-colour, whilst nearer to the head exists a third dark band. Dorsal and caudal fins margined with orange.

173. CHEILINUS CHLORURUS, Bl.

174. LABRICHTHYS BICOLOR, sp. nov.

D. 9/11. P. 13. V. 1/5. A. 3/10. C. 15. L. l. 26. L. tr. 5/12.

Length of head nearly $\frac{1}{3}$, of caudal $\frac{1}{6}$, height of body $\frac{1}{3}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{2}$ diameter from end of snout, 1 diameter apart.

Teeth in a single row; no posterior canines.

Fins. Posterior dorsal spines the longest. Caudal cut square.

Scales. About three rows of very small ones on the cheeks, and a few on the upper part of the opercles.

Colours. All that portion of the body behind a line from the commencement of the dorsal to the base of the anal dark violet, some of the lower scales being blue-spotted; anterior to this nearly white below, but darker along the top of the head, whilst most of the scales have more or less dark spots.

Length nearly 4 inches in the single specimen obtained.

175. EPIBULUS STRIATUS, sp. nov.

D. 9/10. P. 11. V. 1/5. A. 3/8. L. l. 19. L. tr. 2/7.

Length of head above $\frac{2}{5}$, of caudal $\frac{2}{11}$, height of body $\frac{2}{5}$ of the total length.

Eyes. Diameter $\frac{2}{7}$ of length of head, 1 diameter from end of snout and apart.

The extremity of the lower jaw reaches to opposite the posterior margin of the orbit, and the posterior process of the intermaxillary to opposite the last third of the orbit.

Fins not elongated.

Lateral line interrupted opposite the middle of the soft dorsal.

Colours. A white line between the orbits, and two more on the head, the first of which runs from the eye to the snout; the second descending from the orbit meets with the one from the opposite side. Body greenish brown, with five narrow milk-white vertical bands: the first runs from the opercles to before the ventral fin; the second from the second dorsal spine to the end of the ventral fin; the third from the centre of the dorsal spines to the base of the anal; the fourth from the end of the dorsal fin to the end of the anal; and the fifth round the base of the caudal. Soft dorsal and termination of anal white.

Length of single specimen $1\frac{5}{10}$ inch.

176. HEMIGYMNUS MELANOPTERUS, Bl.

The coloration of the caudal fin was darker in the Andamanese specimens than shown in Bleeker, and the scales were dotted with blue.

177. STETHOJULIS STRIGIVENTER, Bennett.

178. PLATYGLOSSUS SCAPULARIS, Bennett.

179. PLATYGLOSSUS LEPARENSIS, Blkr.

Andamans and Nicobars.

180. PLATYGLOSSUS NOTOPSIS, K. & v. H.

181. JULIS LUNARIS, Linn.

This fish is easily taken by a bait; and the natives appear rather to esteem it as food.

Colours. Pectoral spot reddish violet. Head violet, with several oblique reddish bands. Body green; each scale with a vertical red streak, forming bands. Dorsal fin red, with a blue and yellow margin. Anal violet, with a yellow edge. Caudal yellow, its base and lobes green.

182. GOMPHOSUS MELANOTUS, Blkr.

D. 8/13. P. 16. V. 1/5. A. 2/11. C. 13. L. l. 26. L. tr. 3/10.

Caudal fin cut square in this specimen.

Colours. Upper part of head and back deep brown, becoming lighter on the sides; each scale darkest at its base; cheeks pinkish. Pectoral yellow. Vertical fins dark-coloured, becoming deep brown externally, with a very narrow light edge; caudal the same, with black margin, and a rather wider white edging. Ventrals whitish, the outer ray brown.

183. CALLYODON VIRIDESCENS, Rüpp.

Common.

184. PSEUDOSCARUS RIVULATUS, C. & V. *Ar-dah*, And.

D. 9/10. P. 14. V. 1/5. A. 2/9. L. l. 22. L. tr. 2/7½.

This beautiful fish is mostly taken near coral-reefs.

185. PSEUDOSCARUS TROSCHELLI, Blkr. *Poo-eo-dah*, And.

Very common, and eaten by the aborigines.

Family GERRIDÆ.

186. GERRES FILAMENTOSUS, C. & V. *Po-ro-chab-dah*, And.

187. GERRES POETI, C. & V.

188. GERRES ACINACES, C. & V.

189. GERRES ABBREVIATUS, Blkr.

One specimen 6 inches long.

Order ANACANTHINI.

Family PLEURONECTIDÆ.

190. PSEUDORHOMBUS ARSIUS, H. B.

191. PSEUDORHOMBUS RUSSELLII, Gray. *Ky-tha-thong-dah*, And.

In some examples of this common species the body and fins were covered with fine black spots.

192. RHOMBOIDICHTHYS LEOPARDINUS, Günther.

D. 80. A. 68. L. l. 76.

193. PARDACHIRUS PAVONINUS, Lacép.

Order PHYSOSTOMI.

Family SILURIDÆ.

194. PLOTOSUS CANIUS, H. B. *Lee-mee-dah*, or *Bon-dah*, And.

Found in the muddy estuaries in considerable numbers.

195. PLOTOSUS ANGUILLARIS, Bl.

Found in the same localities as the last species.

196. ARIUS SUMATRANUS, Bennett.

Several specimens of this fish were obtained.

197. ARIUS ANDAMANENSIS, sp. nov. *E-roung-ud-dah*, And.

D. $\frac{1}{7}|0$. P. $\frac{1}{10}$. V. 7. A. 16. C. 17.

Length of head nearly $\frac{1}{5}$, of caudal $\frac{1}{4}$, height of body nearly $\frac{1}{5}$ of the total length.

Eyes. Diameter $\frac{1}{4}$ of length of head, $1\frac{1}{4}$ diameter from end of snout in the young, but greater in the adult.

Head slightly broader than high. The median longitudinal groove does not extend so far as the base of the occipital process, which last is once and a half as long as it is broad at its base, and strongly keeled; basal bone narrow. Upper surface of head granulated. The maxillary cirri extend to a little beyond the base of the pectoral-fin, and the external mandibular ones to its base.

Teeth. Villiform in both jaws and palate, in which latter situation they form a triangular band on either side, converging anteriorly, but slightly separated down the median line.

Fins. Pectoral and dorsal spines serrated on both sides, the former as long as the head without the snout, the latter somewhat longer. Upper lobe of caudal the longest.

Colours. Silvery; the fins stained darker, and a black spot on the adipose dorsal.

Hab. Andamans, where this fish attains a large size, but is far from being common.

198. KETENGUS TYPUS, Blkr.

Family SCOPELIDÆ.

199. SAURIDA TOMBIL, Cuv. & Val.

Family SCOMBRESOCIDÆ.

200. BELONE CAUDIMACULATA, C. & V. *Thook-o-doo-noo-dah*, And.

201. BELONE CHORAM, Forsk.

Colours. In a young specimen brown, with eleven dark vertical bands narrower than the ground-colour, also a dark band through the eye.

A common species, growing to a large size.

202. HEMIRAMPHUS BUFFONIS, C. & V. *Koo-door rock-o-dah*, And.

Common.

203. HEMIRAMPHUS UNIFASCIATUS, Ranz.

Very common.

Family CYPRINODONTIDÆ.

204. HAPLOCHILUS PANCHAX, H. B. *Cho-to-dah*, And.

This fish grows to a magnificent size at the Andamans, compared with what it attains in India.

Family CYPRINIDÆ*.

As far as my investigations extended, I was unable to obtain any specimens of true Carps on the Andamans.

Family CLUPEIDÆ.

205. ENGRAULIS RUSSELLII, Blkr. *Zoo-roo-cart-dah*, And.

206. ENGRAULIS MALABARICUS, Bl. *O-pul-dah*, And.

207. ENGRAULIS BŒLAMA, Forsk.

D. 14. A. 28–30. L. l. 36.

Eight spinate scales before, and seven behind the ventral fins.

A golden spot behind the opercles.

Large quantities of these fish are captured, dried, and sold; still no one could be found who had ever heard of any deleterious or poisonous results following their employment as food.

208. ENGRAULIS TELARA, H. B.

209. CHATOESSUS CHACUNDA, H. B. *Kore-paig-dah*, And.

* In the 'Proceedings of the Zoological Society,' 1865, p. 296, I described the genus *Platacanthus* as new amongst the Loaches; however, the specimen subsequently turned out to belong to a known genus. Since then I described another species (1867, p. 941), as *Platacanthus maculatus*. As the genus *Platacanthus* is considered a synonym of *Lepidocephalichthys*, it becomes necessary to define and name the genus to which the latter specimen belongs.

Genus JERDONIA, gen. nov.

Body elongated. Barbels eight, one rostral, two maxillary, and one mandibular pairs. A free bifurcated suborbital spine. Dorsal fin elongated (thirty rays). Internal pectoral ray osseous. Origin of anal slightly posterior to the termination of the dorsal.

210. CLUPEA NEOHOWII, C. & V.

This species of Sardine existed in abundance at the Andamans; and on sending out four convicts at Port Mouat with cast-nets to obtain them, they captured 260 lb. weight in four hours, and then had to return, as their boats could hold no more. They asserted they could continue fishing at this rate for months, had they a market for their captures. I tried making oil from these Sardines, but did not succeed; the reason of which I discovered subsequently at Calicut, on the Malabar coast. There the oil is prepared after the breeding-season of these fishes (namely June and July), subsequent to which period they become fat, and about August are suited for the manufacture of oil, and continue so for four months. Unless the livers are fat, no oil can be made; and it is either prepared from that gland alone or from the entire fish*.

211. CLUPEA MELANURA, C. & V.

I found this species pretty abundant, but not so much so as the last; they seem to prefer more sheltered localities.

212. PELLONA DITCHOA, C. & V. *Poo-nă-no-dah*, And.

213. DUSSUMIERIA ACUTA, C. & V. *O-pul-lah*, And.

214. DUSSUMIERIA ELOPSOIDES, Blkr.

215. ELOPS SAURUS, Linn.

216. MEGALOPS CYPRINOIDES, Brouss. *O-pul-dah*, And.

Family MURÆNIDÆ.

217. ANGUILLA LABIATA, Ptrs. *Pa-lug-dah*, And.

It is remarkable that this species, hitherto recorded from the east coast of Africa, should be found in the Andaman Islands.

218. ANGUILLA BICOLOR, M'Clell.

In possessing this East-Indian species, the Andamans show their similarity to the continent of Hindoostan and the Burmese territory.

219. ANGUILLA VIRESCENS, Ptrs. *Jee-tah-dah*, And.

The same remark applies to this East-African species as already made on the *A. labiata*.

220. MURÆNESOX TELABON, Cuv.

221. MURÆNICHTHYS SCHULTZII, Blkr.

222. OPHICHTHYS COLUBRINUS, Bodd.

* See my paper on "Turtle- and Fish-oils" (Madras Monthly Journal of Med. Science, April 1870).

223. Muræna rüppellii, M'Clell.

This pretty species of Banded Eel was brought to me by the Andamanese as the only sort of Sea-snake existing there.

224. Muræna tessellata, Rich.

225. Muræna tigrina, Rüppell.

226. Muræna undulata, Lacép.

227. Muræna picta, Ahl.

228. Muræna nebulosa, Ahl.

229. Muræna macrurus, Blkr.

Specimen 36 inches long. Another specimen exists in my collection from Madras.

230. Muræna flavomarginata, Rüpp.

231. Muræna nigra, sp. nov.

Length of head ¼ of body, tail nearly ½ of the total length.

Eyes small, diameter half that of the snout.

Body and tail slender.

Posterior nostril a circular patent opening; anterior nostril tubular. Gill-openings narrow. Cleft of mouth extending to some distance behind the orbit.

Teeth generally obtuse; the maxillary ones pointed and in two rows; the intermaxillaries in several obtuse rows; the palatines rounded and biserial.

Fins. Dorsal and anal moderately developed; the former commencing just behind a vertical line from the gill-opening, and half as high as the body.

Colour uniform black.

This specimen, 16 inches long, was discovered under a large stone at low water at Port Blair.

Family Pegasidæ.

232. Pegasus draconis, Linn.

This specimen was given me by Dr. Rean; a convict picked it up on the shore. I twice saw, but did not obtain, what appeared to be this fish whilst at the Andamans.

Order LOPHOBRANCHII.

Family Syngnathidæ.

233. Syngnathus spicifer, Rüpp. *Eă-de*, or *Lah-ă thă-dah*, And.

Microphis tenuis, Blyth.

The native name of this species signifies a Turtle's tail, which the Pipefish is considered to resemble.

234. GASTROTOKEUS BIACULEATUS, Bl.

The tail of the specimen obtained by me at the Andamans has been injured, as pointed out to me by Dr. Günther.

235. HIPPOCAMPUS COMES, Cantor.

This specimen was given me by Dr. Rean.

Order PLECTOGNATHI.

Family SCLERODERMI.

236. TRIACANTHUS BIACULEATUS, Bl. *Ko-tah-thoo-lay-po-dah*, And.

Very common.

237. BALISTES VIRIDESCENS, Bl. Schn.

Colours. A light ring round the muzzle, joining one from below, and dividing the black lip from a black band on the forehead. Body brownish olive, each scale darkest in the centre. A wide blackish band proceeds from the eye to the base of the pectoral fin. Vertical fins yellowish, with dark margins. Large blue blotches on the first dorsal fin.

238. BALISTES FLAVIMARGINATUS, Rüpp.

239. BALISTES ACULEATUS, Linn.

Some beautiful specimens of this fish were brought me by the aborigines, who obtained them with their bows and arrows.

240. BALISTES UNDULATUS, Mungo Park.

241. ANACANTHUS BARBATUS, Gray.

242. OSTRACION TRIGONUS, Linn.

This specimen was given to me by Dr. Rean.

Family GYMNODONTES.

243. TETRODON LUNARIS, Bl. Schn. *Cha-mo-dah*, And.

The aborigines use both this and other species of *Tetrodon* as food; but it was observed to me that their intestines will assimilate any thing.

244. TETRODON TESTUDINEUS, Linn.

245. TETRODON IMMACULATUS, Bl. Schn.

246. TETRODON SIMULANS, Cantor.

247. TETRODON RETICULARIS, Bl. Schn. *Ko-pud-dah*, And.

Subclass CHONDROPTERYGII.

Order PLAGIOSTOMATA.

Family CARCHARIIDÆ.

248. CARCHARIAS WALBEEHMII, Blkr. *Ei-dah*, And.

249. CARCHARIAS MELANOPTERUS, Q. & G.

This is the species from the liver of which most of the medicinal fish-liver-oil is prepared in the Government factory at Calicut. No livers are accepted under 40 lb., and one was received of 290 lb. weight.

The presence or absence of the large marine *Plagiostomes* on the coasts of India greatly depends on the whereabouts of the Oil-Sardines and other shoals of *Clupeidæ* and *Scombridæ*. This is the chief reason why the western coast and Ceylon have so many more Sharks and Sawfishes than the eastern, where the *Clupea neohowii* and shoals of *Clupeidæ* and the *Scomber kanagurta* are comparatively rare. The Andamans, abounding in fish, possess their full complement of Sharks. Where small fish are in plenty as food, the Sharks appear to prefer them to human beings.

250. ZYGÆNA BLOCHII, Cuv.

Family PRISTIDÆ.

251. PRISTIS CUSPIDATUS, Latham.

The livers of this fish are useful for medicinal oil; a female Sawfish at Calicut, 14 feet long, had one of these glands weighing 185 lb.

Family RHINOBATIDÆ.

252. RHYNCHOBATUS DJEDDENSIS, Forsk.

253. RHINOBATUS GRANULATUS, Cuv.

Family TRYGONIDÆ.

254. TRYGON UARNAK, Forsk.

Family MYLIOBATIDÆ.

255. AËTOBATIS NARINARI, Euphr. *Rā-tā-charm-dah*, And.

The foregoing list of 255 species of fish is interesting as demonstrating the enormous numbers of sorts which resort to the almost unfished grounds off the Andaman Islands, where the sea appears alive with the finny tribes. Here the Sharks and Sea-perches find abundance of food; and the aborigines are able to sustain themselves by procuring fish from the sea, merely by the use of spears and bows and arrows.

It must also be remarked that the time I spent there was very little above three weeks; and though it is true that I had every assistance from the local authorities and the aborigines, and spared no personal

exertion, still very many species must have escaped me. However that may be, I am unaware of such a large number of marine species having been collected anywhere in such a short period.

As far as possible the foregoing fish have, when a doubt has arisen, been examined with the specimens at the British Museum, for facilities of doing which, and also for personal assistance, I have to express my obligations to Dr. Günther.

I have placed a considerable number of duplicates in the British Museum, retaining, however, my own large collection intact in this country until such time as I again return from India, when I trust I shall bring with me further additions to it.

2. Note on the Habits of the Pampas Woodpecker (*Colaptes campestris*). By CHARLES DARWIN, F.R.S.

In the last of Mr. Hudson's valuable articles on the Ornithology of Buenos Ayres*, he remarks, with respect to my observations on the *Colaptes campestris*, that it is not possible for a naturalist "to know much of a species from seeing perhaps one or two individuals in the course of a rapid ride across the Pampas." My observations were made in Banda Oriental, on the northern bank of the Plata, where, thirty-seven years ago, this bird was common; and during my successive visits, especially near Maldonado, I repeatedly saw many specimens living on the open and undulating plains, at the distance of many miles from a tree. I was confirmed in my belief, that these birds do not frequent trees, by the beaks of some which I shot being muddy, by their tails being but little abraded, and by their alighting on posts or branches of trees (where such grew) horizontally and crosswise, in the manner of ordinary birds, though, as I have stated, they sometimes alighted vertically. When I wrote these notes, I knew nothing of the works of Azara, who lived for many years in Paraguay, and is generally esteemed as an accurate observer. Now Azara calls this bird the Woodpecker of the plains, and remarks that the name is highly appropriate; for, as he asserts, it never visits woods, or climbs up trees, or searches for insects under the bark†. He describes its manner of feeding on the open ground, and of alighting, sometimes horizontally and sometimes vertically, on trunks, rocks, &c., exactly as I have done. He states that the legs are longer than those of other species of Woodpeckers. The beak, however, is not so straight and strong, nor the tail-feathers so stiff, as in the typical members of the group. Therefore this species appears to have been to a slight extent modified, in accordance with its less arboreal habits. Azara further states that it builds its nest in holes, excavated in old mud walls or in the banks of streams. I may add that the *Colaptes pitius*, which in Chile represents the Pampas species, likewise frequents dry stony hills, where only a few bushes or trees grow, and may be continually seen feeding on the ground. According to Molina, this *Colaptes* also builds its nest in holes in banks.

* P. Z. S. 1870, p. 158. † Apunt. ii. p. 311 (1802).

Mr. Hudson, on the other hand, states that near Buenos Ayres, where there are some woods, the *Colaptes campestris* climbs trees and bores into the bark like other Woodpeckers. He says, "it is sometimes found several miles distant from any trees. This, however, is rare, and it is on such occasions always apparently on its way to some tree in the distance. It here builds its nest in holes in trees." I have not the least doubt that Mr. Hudson's account is perfectly accurate, and that I have committed an error in stating that this species never climbs trees. But is it not possible that this bird may have somewhat different habits in different districts, and that I may not be quite so inaccurate as Mr. Hudson supposes? I cannot doubt, from what I saw in Banda Oriental, that this species there habitually frequents the open plains, and lives exclusively on the food thus obtained. Still less can I doubt the account given by Azara of its general habits of life, and of its manner of nidification. Finally, I trust that Mr. Hudson is mistaken when he says that any one acquainted with the habits of this bird might be induced to believe that I "had purposely wrested the truth in order to prove" my theory. He exonerates me from this charge; but I should be loath to think that there are many naturalists who, without any evidence, would accuse a fellow worker of telling a deliberate falsehood to prove his theory.

3. Notes on three Species of Tortoises living in the Society's Gardens. By Dr. J. E. GRAY, F.R.S. &c.

(Plates XL. & XLI.)

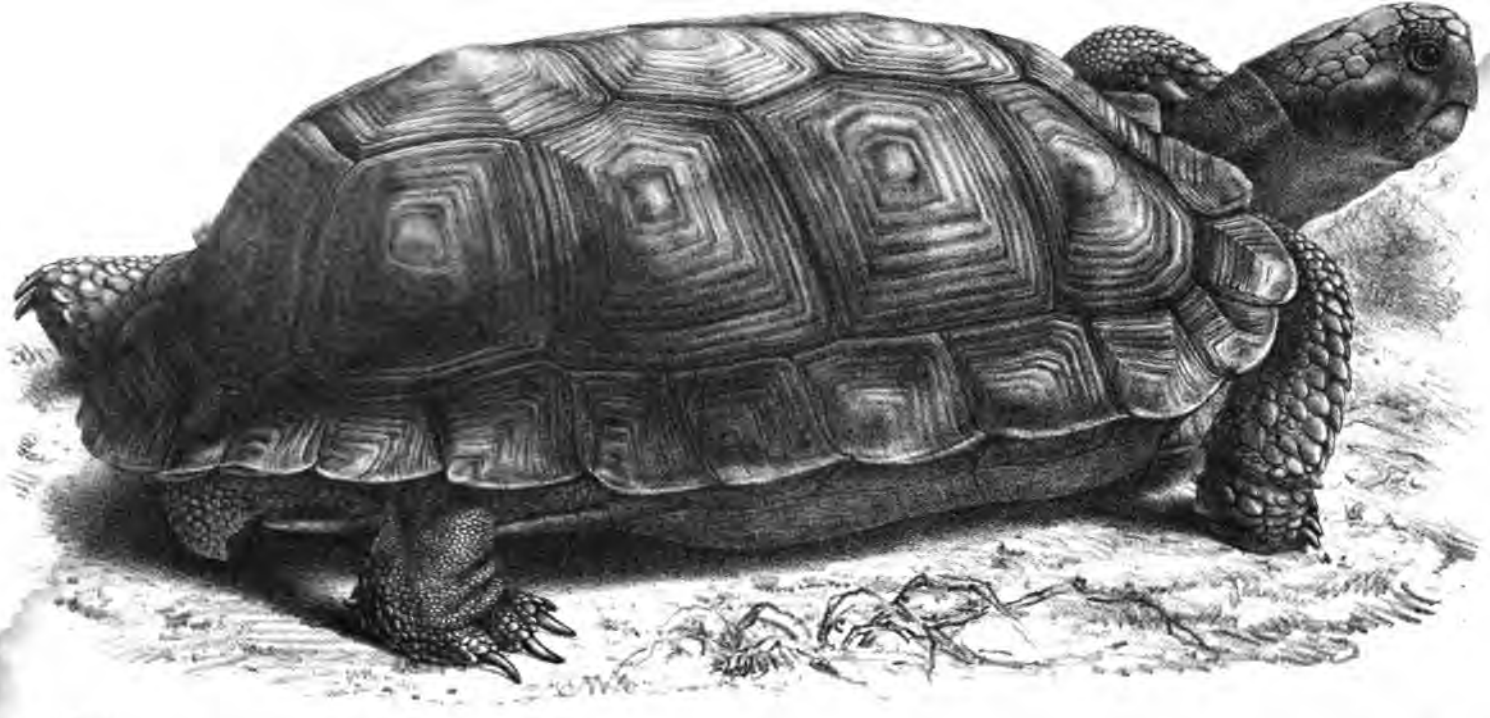
There are at present living in the Society's Gardens two species of Land-Tortoises and one of the more terrestrial Terrapins, which Mr. Bartlett assures me came direct from Chili. They are very interesting as containing at least one species of *Testudo* not as yet recorded in the catalogue. The other *Testudo* appears to be *T. elephantopus*, or the "Elephant-Tortoise of the Galapagos" of Mr. Harlan, which has hitherto been confounded with *T. indica*.

The more terrestrial Terrapin is *Rhinoclemmys annulata*, described in the Proc. Zool. Soc. 1860, p. 231, t. 29 (*Geoclemmys annulata*), as coming from Ecuador; so it must extend over a large part of South America. The animal has not been before described. It is black. The fore legs are covered with very large, convex, unequal scales; scales black, tipped with white, forming an interrupted band; toes very short, scarcely produced, covered with two or three convex band-like scales above; claws short, thick, black, white at the tip; hind feet with short, thick, black claws; scales of the soles of the feet large, convex, black, varied with white.

The others are:—

1. TESTUDO (GOPHER) CHILENSIS. (Plate XL.) B.M.

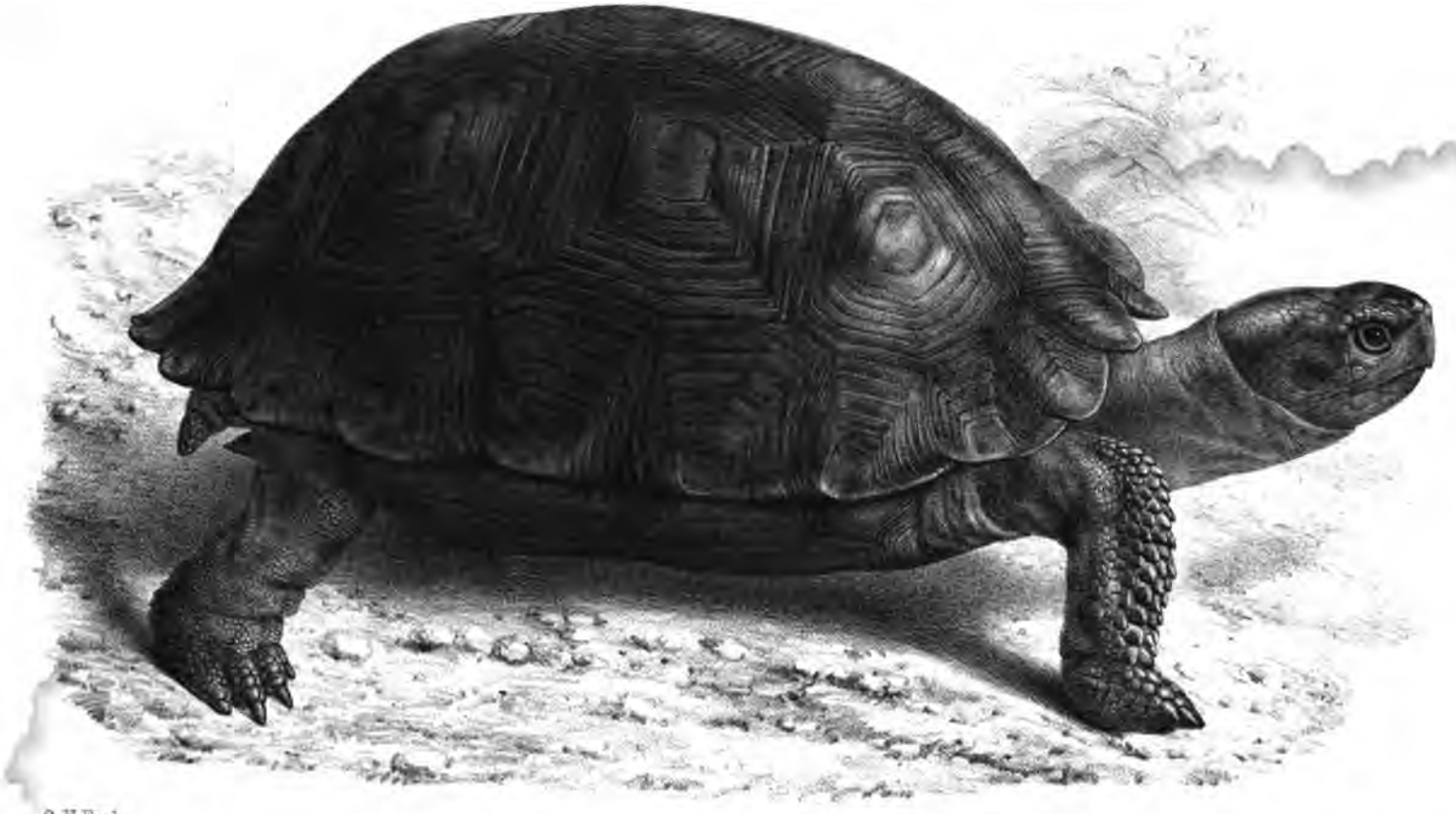
Testudo sulcata, D'Orbigny, Voy. dans l'Amér. Mér. Rept. 6; Burmeister, Reise durch die La Plata-Staaten, ii. 521.



G.H.Ford.

Mintern Bros. imp.

Testudo chilensis.



O.H.Ford.

Mintern Bros imp.

Testudo elephantopus.

Testudo mauritanica, Démoussy, Descr. de la Confédération Argentine, ii. 38.

Hab. Chili (*Weisshaupt*); N. Patagonia (*D'Orbigny*); Mendoza and the Pampas (*Burmeister*); Monte Video and Buenos Ayres (*Démoussy*).

Beak keeled in front and strongly bidentate. Shell depressed, oblong; middle of the back rather flattened, dirty yellow; areola central; nuchal plate distinct; marginal plates shelving, with a very short keel; front and hinder marginal plates reflexed, making a serrated edge; head with one pair of supranasals; a hexangular (central) and two triangular frontal plates between the eyes, with some small shields between them and the supranasals, and a pair of elongated occipital plates; fore legs with a large spur at the elbow-joint, and numerous conical spines on the underside of the thighs, two of which are larger than the rest. The scales in front of the fore legs very large, unequal, convex.

This species is very like *T. sulcata* from Abyssinia in colour and general appearance; but the shell is much more depressed, and the marginal shields, which in that species are very high, with a sharp, narrow keel beneath, are in this species only moderately high and very sharply keeled. The pectoral plates are narrow towards the centre, and gradually spread out in a triangular shape, one-third from the centre; while in *T. sulcata* these plates are narrow and linear for two-thirds of their width and then suddenly expand into a pentangular disk. In this species the last vertebral shield is the width of the caudal, and one-half of the last and one-half of the last but one of the hinder marginal shields, whereas in *T. sulcata* it is only the width of the caudal and one-half of the last hinder marginal shields.

The reception of specimens of *Testudo elephantopus* and *T. chilensis* direct from South America, and the power of comparing them with specimens of *Testudo indica* from Seychelles and other localities in the Old World, and with *Testudo sulcata* from Africa, have been very important, as by the comparison of the actual specimens of these animals together it has been distinctly proved that, instead of the same species inhabiting the Old and the New World (which was an anomaly among the Testudinata), these species, which have been regarded as the same, are perfectly distinct; indeed *Testudo sulcata* from Africa is not only distinct from *T. chilensis*, but the two species belong to two different subgenera, the one belonging to the Old and the other to the New World. The only other instance, of which I am aware, of a land-Tortoise being supposed to be common to the two continents, is a species of *Kinixys*, which was first received from Demarara and Guadeloupe, but which is now known to be an African genus; and the specimens must have been taken to Demarara by some ships from Africa; for I am informed that it is not even colonized, much less naturalized, in that country; but it is probable that some of the negroes who are fond of living animals may have taken them with them.

2. TESTUDO ELEPHANTOPUS. (Plate XLI.) B.M.

Testudo elephantopus, Harlan, Journ. Acad. Nat. Sc. Phil. v. 284, t. xi. (bad).

Testudo planiceps, Gray, P. Z. S. 1853, p. 12; Cat. Sh. Rept. p. 6.

Testudo californica, Férussac, Bull. Sci. Nat. 191.

Testudo nigra, Quoy & Gaim.; Frey. Voyage Zool. i. 174, pl. 40; Meyen, Nov. Acta Akad. Leop. Carol. xvii. 188, t. xiii.

Geochelone schweiggeri, Fitzinger, Wiener Sitzungsberichte, x. 403 (1853). These are probably all synonyms of this species.

Shell and animal black. Head with one pair of frontal and a square crown-shield, with a flat crown. Thorax oblong, rather depressed, black; shields irregularly concentrically grooved; areola central. The beak slightly keeled in front and slightly bidentate. The fore legs covered with rather large scales, with a spur-like tubercle on the inner side of the elbow-joint; hind legs covered with numerous small scales, with larger scales on the soles, those on the hinder margin being prominent; fifth vertebral shield as broad as the two caudal and two hinder marginal shields.

This species is exceedingly like *Testudo indica*, but is distinguished from it by the flatness of the crown and the absence of a nuchal plate. Length over the back 10 inches; width 9½ inches. The sternum truncated in front; gular plates small; pectoral plates narrow; anal plates small, notched behind.

There are two young specimens and several shells of a black Tortoise in the British Museum without any nuchal plates, which have hitherto been recorded as varieties of *T. indica*. They are all without any special habitat, and therefore may be from Chili.

This species is probably the Elephant-Tortoise of the Galapagos Islands, *Testudo elephantopus*, Harlan, who described his specimen as having "twenty-three marginal scutes—that is, having eleven on each half of the shell and a single one posteriorly." I also think, from the flatness of the head in the living animal, that the skull I figured under the name of *T. planiceps* is of this species. This I formerly doubted, because there was a specimen in the Zoological Society's Gardens, said to come from the Galapagos Islands, which had a very convex forehead, like the Indian specimens; but perhaps the habitat in this case was a mistake, or might not have belonged to the example which I examined.

4. Descriptions of two new Tortoises from India, in the Collection of T. C. Jerdon, Esq. By Dr. J. E. Gray, F.R.S. &c.

Mr. T. C. Jerdon has kindly sent me for examination the Tortoises which he collected in various parts of India. The collection consists of:—1st. *Batagur thurgi*, showing that the shell of this Tortoise, which has usually been classed with *Emys*, has a contracted front and hind margin of the cavity of the shell, as well as the masticating-

surface of the typical *Batagurs*. 2nd. A series of the *Pangshura flaviventris* of Günther, from Delhi, where it is common; but all the specimens, like the one we recently received from Cuttack from Mr. Day, have the sternum spotted, varied with black like the other species of the genus; the specimens only vary in some having the first vertebral more or less distinctly urn-shaped or contracted on the sides than others. 3rd. Two adult specimens of *Pangshura smithii* from Punjab, where it is abundant, which show the permanence of the characters assigned to this species.

Besides these it contains two species which had hitherto not occurred to me:—

1. PANGSHURA SYLHETENSIS, Jerdon, Journ. Asiat. Soc. Beng. 1870, p. 69.

Shell olive-brown, strongly and sharply dentated behind. The sides of the back shelving, but ventricose and with a central dorsal prominence. First vertebral plate five-sided, truncated behind, rather produced in front, with a blunt keel ending in a tubercle behind; the second broadly hexangular; the third elongate, narrowed

Fig. 1.



Pangshura sylhetensis.

and produced behind, with a very prominent keel ending in an acute point behind; the fourth much elongated, narrow and produced in front, with a narrow, sharp keel more prominent behind; the fifth pentangular, longer than broad, the hinder sides being as wide as three of the marginal plates. Underside pale black, varied.

Hab. Sylhet, at the foot of the Khasia hills, in running streams.

The young specimen has the two front shields rather broader compared with the length than the others; and the largest specimen has the fourth vertebral shield rather irregular-shaped. This species differs from *P. flaviventris* in the keel of the first three shields being pale and not black, and much more indistinctly marked than in *P. tectum*; but is at once known by its strongly dentated margin and by the three hinder marginal plates on each side only occupying the hinder margin of the fifth vertebral plate. In all the other *Pangshuræ* the hinder margin of the fifth plate only occupies the width of two and a half or two and a quarter marginal plates.

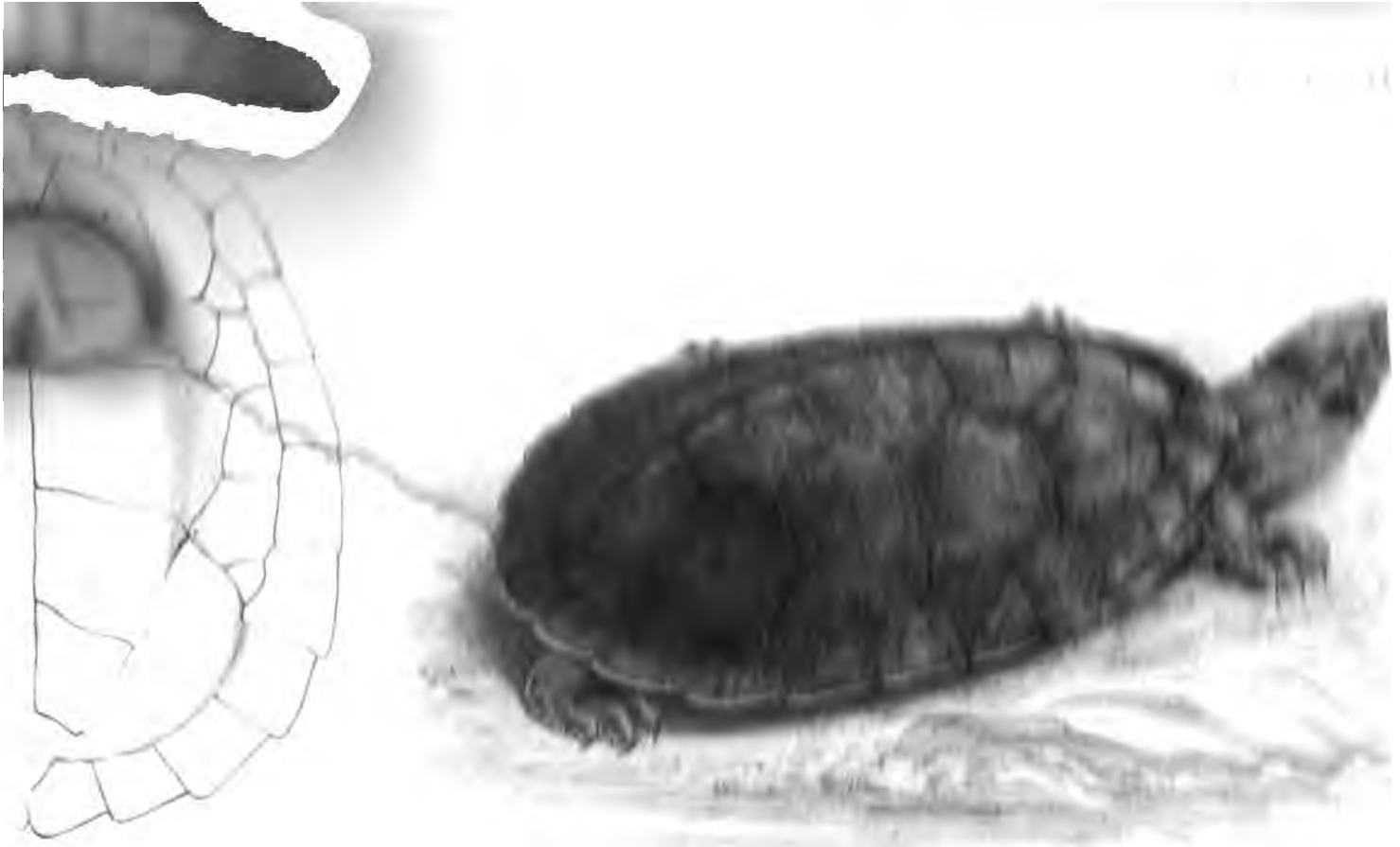
2. PANGSHURA VENTRICOSA, Suppl. Cat. Sh. Rept. p. 60.

The shell dark brown, oblong, and ventricose above, reddish yel-

Fig. 2.



Pangshura ventricosa.



G H Ford

low, varied with black beneath; the hinder margin entire. Vertebral plates bluntly keeled in front; the first pentangular, twice as long as broad, narrow in front, and gradually narrower and truncated behind; the second elongate, suddenly narrowed and produced behind and rounded at the end; the third smaller than the second, pentangular, notched in front, narrow, acute, with a sharp prominent keel behind; the fourth elongate, oblong, twice as long as broad, six-sided, suddenly contracted and produced in front.

Hab. Assam.

This species is most like *Pangshura tecta*; but the shell is much more ventricose, and the first vertebral plate is much narrower and longer compared with its width, and the second vertebral plate is very differently shaped, as is also the fourth; but this may be an unusual variation. But the lightness, thinness, and ventricose character of the shell marks it as a peculiar species. The fourth, sixth, eighth, and especially the tenth marginal shields have the upper edge produced and more or less extended up between the sutures of the costal shields.

5. On the Family *Dermatemydæ*, and a Description of a living Species in the Gardens of the Society. By Dr. J. E. Gray, F.R.S. &c.

(Plate XLII.)

Mr. Bartlett has sent to me to-day (August 6th) four living freshwater Tortoises to examine and name, recently purchased for the Society's collection, which, I am informed, came from the Laguna de Terminos in Yucatan.

They consist of two specimens of *Cinosternon* with a black head and a yellowish spot over the nose (but as yet I must own I do not know the characters of the species of this genus), an adult specimen of *Emys ornata* (the latter animal would not extend its neck, so that I could not see the colour of his head and neck; but it snapped most furiously at every thing that came within a few inches of it, and as rapidly withdrew its head), and a young specimen of what I take to be *Dermatemys abnormis* of Mr. Cope, which has not before come under my observation.

In the 'Proceedings' of the Society for 1847, p. 55, I described the shell of a large freshwater Tortoise which had been presented to the Society by Lieut. Mawe, R.N., who found it in "South America" in 1833, under the name of *Dermatemys mawii*. It is peculiar, having the sterno-costal suture covered with four large distinct plates; and I stated that it in this respect agreed with *Platysternon*, but that it had a very differently formed shell and had much the external appearance of *Phrynops geoffroyi*, but there was no appearance of any scar on the inner surface of the sternum for the attachment of the pelvis, and that it had no intergular plate.

The shell here described was presented to the British Museum by the Zoological Society, and is figured in the 'Catalogue of Shield Reptiles in the British Museum,' tab. 21.

In the 'Catalogue of Tortoises in the British Museum,' and in the 'Catalogue of Shield Reptiles,' I formed a particular section in the family *Emydæ* for *Platysternon* and *Dermatemys*, because they had these additional plates on the sterno-costal suture. The group contains two families: the *Dermatemydæ* are essentially water Tortoises, with broadly webbed feet; the *Platysternidæ* are amphibious, and they have strong narrowly webbed toes and the front of the fore legs covered with large plates.

M. Auguste Duméril, in the 'Catalogue Méthodique des Reptiles' described, in 1851, a species under the name of *Emys berardii* from two specimens in the Museum of Paris, said to have come from South America. In the 'Archives' of the museum, vol vi., for 1852, he redescribes and figures the species, observing that one of the specimens in the Museum was received from "Lieut. Maw." This must have been obtained from the Zoological Society, and is doubtless a fellow specimen to the one I described, and is said to have come from South America without any special habitat; and the other was brought by Captain Berard directly from the fresh waters of "Vera Cruz, Mexico." This species is very briefly and indistinctly described in both works, and the figure is by no means good. Probably M. Berard's specimen must be in a bad state; for the shell is described as covered with fine "irregular rugosities." The indications of division of shields, especially the dorsal ones, are very indistinct.

He figures the mouth, showing the alveolar surfaces of both jaws (t. xv. f. 4), but does not describe it. In the form of the mouth and the obscure streak from the back of the head, and the gular plate showing no indications of a central suture, it agrees with the specimen now in the Zoological Gardens, but is evidently an old specimen, while that which we have is young. M. Duméril does not take any notice, either in the description or figure, of the existence of any sterno-costal shields; indeed the sutures of them seem to be entirely obliterated in the aged specimen he figures; and he separates it from the *Emys trivittata* (that is, an Indian *Batagur*) by the absence of the three black bands and the difference of its origin.

Professor Owen in 1853, in the 'Monograph of the Fossil Chelonians of the Wealden Clay and Purbeck Limestone,' published by the Palæontological Society, published a genus under the name of *Pleurosternon*, which he characterizes thus:—"Testa depressa, lata, complanata; sternum integrum, ossibus undecim compositum, per ossicula marginalia cum testa conjunctum, scutis submarginalibus inter scuta axillaria et inguinalia positis." He does not make any reference to my genus *Dermatemys*; but the character here given is the exact counterpart, though in other technical terms, of that genus which was published four years previously; but in the description of one of the species he observes:—

"In addition to the axillary and inguinal plates there are three

scutes, and the under borders of the fifth, sixth, and seventh marginal scutes; these superadded scutes I propose to call 'submarginal scutes.' The *Platysternon megacephalum*, or large-headed Terrapin of the Chinese swamps, presents a corresponding but single supplementary 'submarginal scute' upon the under part of each lateral production of the plastron." This statement about *Platysternon* is entirely erroneous; for that genus, as well as *Dermatemys* and *Pleurosternon*, has three small "submarginal scutes" between the abdominal and marginal plates (see Proceedings of the Zoological Society, 1831, p. 106, where the genus was originally described, and the 'Catalogue of Shield Reptiles,' p. 49). The *Pleurosterna* are found in the freshwater limestone of Purbeck; and Professor Owen divides them into four species. I am still inclined to retain the genus, and I think that probably, when we have more materials, we shall find that the fossil genus will form a distinct group of the family.

Mr. Agassiz, in his 'Contributions to the Natural History of the United States,' published in 1857, probably misled by Duméril's figure, observes:—"*Emys berardi*, Dum. et Bib., seems also to belong to this genus (*Ptychemys*), judging from the description and figure of the jaws published by A. Duméril, 'Archives du Museum,' vol. vi. p. 251, t. 15" (vol. i. p. 434).

The British Museum having received from Mr. Salvin a specimen of *Dermatemys*, which he obtained in Guatemala, I published in the 'Proceedings of the Zoological Society,' 1864, p. 125, a history of the genus and a description of the animal, which, unfortunately, was not in a very good state, as it had accidentally got dry through the evaporation of the spirit and had again been placed in spirit.

In the 'Proceedings of the Academy of Natural Sciences' for 1868, p. 119, Mr. Cope describes a new species under the name of *D. abnormis*, from the Belize River, Yucatan, sent by Dr. Parsons, which differs in having the gular plates united and the vertebral plates broader than long. He observes that one species of *Dermatemys*, the *D. mavei*, is recognized by Dr. Gray as inhabiting Venezuela and Mexico. The same species, according to the same author, has been subsequently named *Emys berardii* by Prof. Duméril; and he further remarks, "I have not had an opportunity of seeing South-American specimens; but the excellent figure and descriptions of Gray render it certain that the individuals from that country, on which the species are based, really belong to another species from those of Mexico. The collection of the Smithsonian Institution furnishes another species from Belize, which I have hitherto identified as the same; the species may be thus distinguished." In a table he gives the characters by which he proposes to discriminate three species, *D. abnormis*, *D. berardii*, and *D. mavei*.

I do not know why he described his second species under the name of *D. berardii*; for none of the characters which he gives to his species are to be found either mentioned in M. Duméril's descriptions or shown in M. Duméril's plate. I have no specimen possessing such characters as he gives to the species.

I believe that the genus *Dermatemys* will be the type of a new family, which may be called *Dermatemydæ*, and thus characterized.

Fam. Dermatemydæ.

Skull:—the head moderate, rather high, covered with a thin, soft, continuous skin; temples with small polygonal shields; zygomatic arch distinct; tympanum large, covered with a granular skin. Eyes lateral; iris circular, narrow. Nose produced, conical; nostrils apical, flesh-coloured. Beak strong: upper beak coloured like the skin of the head, hard; lower beak strong, hooked in front. Alveolar surface of the upper jaw with a triangular ridge parallel to the outer edge of the jaw, and with a short separate transverse ridge in front, separated from the front of the beak by a deep pit. Lower jaw with three or five strong teeth in front, which fit into the pit in front of the upper jaw. The alveolar surface flat, with a deep central groove along each side. Chin not bearded. Thorax oblong, the hinder edge expanded and slightly reflexed, covered with very thin, membranaceous shields, which have the areola in the young animals on the hinder margin. Sternum flat, united to the margin by a bony symphysis, rounded in front and notched behind. Sternal shields twelve, very thin, membranaceous. The gular plates small, triangular, sometimes united into a single plate, with three additional intramarginal plates on the suture between the triangular axillary and the band-like inguinal plates between the small abdominal and marginal plates. The cavity of the shell scarcely contracted at the opening. The legs short, fringed on the outer side, granular. Toes weak, broadly webbed. Tail short, thick, angular, with ridges of spines and a horny tip.

The head of these animals has much the appearance of *Batagur*, and the shell has a certain resemblance to those of that genus.

The form of the sternum might be mistaken for that of an *Hydraspis*; but it will be found that what looks like the intergular plate is, in fact, the small gular plates, which are sometimes separate, but usually united together, there being only six pairs of plates, without any anterior additional one.

Synopsis of the Genera.

1. Dermatemys. Crown flat. Vertebral shields elongate, the first the shortest. The gular plates separate or united.
2. Chloremys. Crown convex. Dorsal shields wider than long. The gular plates united.

1. Dermatemys.

Head flat above, rather keeled on the sides. The crown narrow and produced behind. Temples with small polygonal shields. Thorax convex. Nuchal shield distinct, short. First vertebral plate as broad as long; second, third, and fourth longer than broad; the fifth narrow and produced in front, broad behind. Gular plates

small, separate or united together into one plate. Intramarginal plates three on each side; the hinder in contact with the abdominal and femoral plates. Abdominal plate long. Axillary plate distinct. Tail conical, with a central ridge of spines on its upper surface, and some scattered tubercles on the sides converging towards the point.

1. DERMATEMYS MAWII.

Gular plates very small, separate.

Dermatemys mawii, Gray, P. Z. S. 1847, p. 56; Cat. Shield Rept. p. 49, t. xxi.

Dermatemys mavei, Cope, Proc. Acad. Nat. Sc. Phil. 1868, p. 120.

Hab. South America (*Mawe*). B.M.

2. DERMATEMYS SALVINII.

The gular plates united into a single narrow triangular plate; sides of the head and neck and upper surface of the feet olive, darker-spotted. In spirits.

Dermatemys salvinii, Gray, P. Z. S. 1864, p. 126 (animal).

Hab. Guatemala (*Salvin*). B.M.

I cannot see any other difference between these two species except the form and union of the gular plates. I believe this is permanent; but we require more specimens to establish the fact. The head and sides of the neck of Mr. Salvin's specimen, in spirit, are pale olive with numerous darker spots; and the feet have some similar spots. There is a little difference in the size of the intermarginal plates of the two specimens, but not more than shown on the two sides of Mawe's original specimen.

Mr. Cope describes his *T. berardii* thus:—"One gular, and an intergular behind it; four or five inner marginals, the posterior in contact with femoral and abdominal; when only four, the median elongate; vertebral scuta much longer than broad; no dorsal keel; abdominal scuta equal or broader than those adjoining." I suppose that this character is from a Mexican specimen. M. A. Duméril's plate does not show any of them. The existence of any gular plate would indicate an irregularity in the specimen, or a structure which has not hitherto occurred to me, and, if normal, would remove the species to *Hydraspidæ*.

2. CHLOREMYS.

Head rather convex above. Thorax rather depressed, broad. Nuchal shield distinct and short. Vertebral plates keeled; the first as broad as long; the second, third, and fourth broader than long; the fifth rather narrowed in front. The gular plates small, united into one narrow triangular shield. The intramarginal plates three on each side; the hinder largest and not, or only slightly, in contact with the femoral plate. Axillary plate triangular. Inguinal band-like, transverse. Tail conical, very short, granular.

The intramarginal plates are sometimes divided in halves on one or both sides.

CHLOREMYS ABNORMIS. (Plate XLII.)

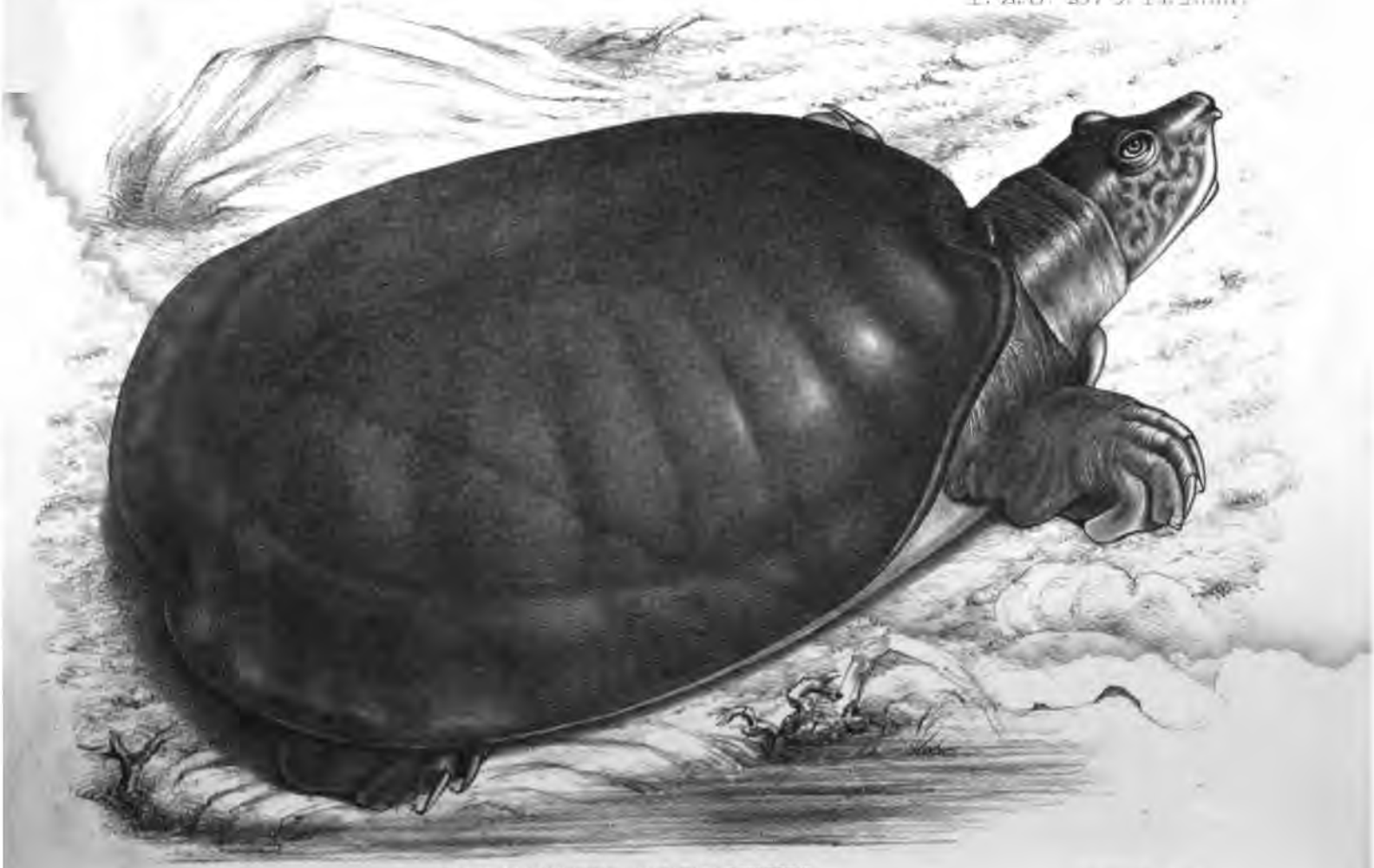
Animal and shell olive above and white below; upper part and sides of the head and neck blackish olive, with a pale streak from the back of the eye, over the ear, along the side of the neck.

Dermatemys abnormis, Cope, Proc. Acad. Nat. Sc. Philad. 1868, p. 120.

Hab. "Yucatan, Belize River (*Dr. Parsons*)."

Mr. Cope's, as well as the one in the Gardens, is a young specimen; but he observes, "I cannot suppose the vertebral scutes become as narrow or the carapace as fully ossified in maturity as in the other species." In the colouring of the head it resembles the figure of M. Auguste Duméril, but not in any other character.

The young living specimen in the gardens of the Society, about 4 inches long, is dull olive-brown above, and pale yellowish beneath. The lower surface of the marginal plates olive, the sternal and submarginal shields being uniform white. The tail is very short, conical, rudimentary. Head black-olive; the end of nose red; the upper beak is of the same colour as the head, and looks as if covered with skin; but this is not the case, for it is very hard. The lower beak paler. There is a very indistinct, broad, rather irregular pale streak from the back edge of the eye along the back of the neck. The nuchal plate very small. Dorsal scutes very thin. The areolæ large, granular; those of the vertebral plates in the middle of the hinder margin of the shield; those of the costal plates rather above the middle of the hinder margin of the shield; of the marginal plates on the hinder outer margin of each shield as visible below as above, rather on the outer edge of the middle of the hinder part of the sternal plate, and quite on the hinder outer margin of the intramarginal plates. The skin of the neck and feet covered with small scales. The outer edge of the legs with a well-marked fringe; the front edge of the fore legs with numerous, very narrow, slightly curved band-like shields. The toes slender, covered above with narrow band-like plates, very broadly webbed to the claws. Claws 5 . 4, black, slender, and acute. Pupil black, surrounded by an olive iris, without any black spot on the side as in American Terrapins. The submarginal plates seem liable to vary in form and number; for in this specimen they differ on the two sides. On the right side there are seven: the first, which is probably an axillary plate, is small; then follow three moderate-sized, the middle one of which is divided across (this is clearly an accidental division); then there is a small triangular plate between the last and the transverse band-like inguinal plate. On the left side, which I should say had the normal structure, there is a rather larger axillary plate: three submarginal plates, the hinder being the largest, and a transverse band-like inguinal plate.



CYCLANOSTEUS SENEGALENSIS.

G.H.Ford.

Mintern Bros imp

6. Notes on a Specimen of *Cyclanosteus senegalensis* living in the Society's Gardens. By Dr. J. E. Gray, F.R.S.

(Plate XLIII.)

The Society acquired by purchase, from a London dealer, on the 30th August, a fine living specimen of *Cyclanosteus senegalensis*, Gray (P. Z. S. 1864, p. 21), which is certainly the first I have ever seen, and, I believe, the first seen alive in Europe; and it is a very interesting animal, as it has the form of the freshwater Tortoise with all the other characters of the Mud-Tortoises or Soft-shield Turtles (Trionychidæ).

The specimen must be nearly adult; but it is not quite so large as the dorsal shield with its margin which the British Museum received from the Earl of Derby, who obtained it from his collector, Mr. Whitfield, from Gambia, which is figured under the name of *Cyclanosteus petersii* in the 'Catalogue of Shield Reptiles,' tab. 29. It has all the sternal callosities developed as in that figure; but the hinder pair, instead of being round and small, are considerably larger and oval. The odd or nuchal bone is placed in the margin of the cartilaginous shield, and separated from the front of the dorsal bony disk by a broad flexible space.

The animal is ovate, depressed; the back is convex, like a large *Batagur* or *Emys*, with a very broad, hard, cartilaginous margin, which is thin, but rounded on the edge; the hinder part of the margin is very broad and expanded, slightly concave on its upper surface, and bent up like that of several of the freshwater Tortoises. The whole upper surface is covered with a thick, smooth, blackish-olive skin, which completely hides the rugosities on the bony disk, and gives the animal the appearance of the skin of a porpoise or dolphin. The under surface is covered with a similar skin, but of a pure white colour, the white on the underside of the margin forming a narrow edge to the dorsal disk; the underside is equally smooth as the back, except over the callosities, which are tuberculated in concentric circles. The skin between the odd bone in the margin and the front of the bony dorsal disk is concentrically wrinkled. The head is rather large, olive or blackish, with pale spots on the upper part of the sides. The nose produced, black; nostrils flesh-coloured, small, circular, separated by a broad septum, and with a small internal lobe on the outer side of each. Eyes lateral; pupil small, black; iris greyish, without any spot on the sides; the lower eyelid larger, thin, pellucid, whitish. The hinder part of the fore feet very broad and expanded, lobulated on the edge, and folded together when contracted, with the three claws on the front part of the foot. The front of the sternum and its flaps as broad and of the same shape as the dorsal disk; the hinder part of the sternum broad; the lateral flaps large and separated from the hinder soft part of the sternum by a deep notch on each side.

This animal is interesting as being intermediate in form between

the usual flat-backed Mud-Tortoises and the very convex *Emydæ* of the Indian tanks, which have a series of marginal bones in the margin of their cartilaginous dorsal shield.

7. Notes on *Bartlettia*, a new Species of Freshwater Tortoises belonging to the Family *Peltocephalidæ*. By Dr. J. E. Gray, F.R.S. &c.

It has been well observed that after the greatest care some new fact in the structure of an animal that has been often observed will occur. I have been for several years collecting together the species of Tortoises, and more especially studying the osteology, and particularly the skulls of the *Testudinata*; I have published several papers on them, and have collected these papers together, with many additional observations and descriptions, as a 'Supplement to the Catalogue of Shield Reptiles in the British Museum,' which is printed and ready for distribution; and yet, before it has actually been published, an accidental circumstance has revealed to me that a series of specimens that I believed were all of one species, coming from nearly the same locality, consists of two most distinct species, belonging to two most distinct genera, marked by very great differences in the form of the alveolar process, which has been confirmed by the examination of the skulls or heads of a series of specimens of each species of different ages.

Mr. Edward Bartlett, during his excursion to Brazil for the purpose of collecting objects of natural history, sent to the Museum a series of specimens of a freshwater Tortoise which he obtained in the freshwater lakes in the region of the upper Amazons. They were considered to be half-grown examples of *Podocnemis expansa*, which they greatly resemble in all external characters; but on Mr. Edward Gerrard, junior, preparing a skeleton of one of them for the collection, it was discovered that it possessed a very different alveolar surface of the upper jaw; and on examining the jaws of the other specimens, they were all found to have the same peculiar character; therefore I have described and figured these jaws; and to point out, in the shortest manner, the differences between it and the other genera of the family, I have formed a tabular distribution of them.

Peltocephalidæ.

Peltocephalidæ, Gray, Suppl. Cat. Sh. Rept. p. 82.

In the skulls of all the genera in this family the vomer is not ossified, and the internal nostrils of the skull are not divided by a septum, but leave a large open aperture in the front of the palate.

The bony vaulted arch that covers more or less completely the depression on the side of the skull for the temporal muscle, is entirely formed, according to Prof. Owen, of an extension of the parietal bone.

In my paper on the genus *Podocnemis* in the 'Proceedings' of the Society I pointed out that the *Podocnemis expansa* of Wagler and the *Emys expansa* of Cuvier, which had been considered the same species, had very different skulls, and I entered into the details of the differences between them.

In my paper in the 'Proceedings' of the Society for 1864, p. 133, I formed them into separate genera.

In *Bartlettia* and *Podocnemis expansa* both the ischiadic and iliac bones are affixed by a bony suture to the sternum.

The thorax of the animals of this family has the cavity contracted, like the shells of the greater part of the Bataguridæ of India. In a very large specimen of *Podocnemis expansa* the front contraction is separated from the margin of the cavity by a considerable space, and may be so in younger specimens; in the genus *Bartlettia* it is continuous with the margin of the cavity, as in all the Batagurs I have examined.

Tribe I. Peltocephalina.

The head high, subcompressed; parietal bone entirely covering the temporal muscle. Nose produced, rounded above, without any longitudinal groove.

1. Peltocephalus.

P. tracaxa, Gray, Supp. Cat. Sh. Rept. p. 84. B.M.

Tribe II. Podocnemina.

Head depressed; parietal expanded, covering the upper part of the temporal muscle, leaving a broad rounded notch in the skull, between the end of the maxilla and the tympanic bone. Nose flattened, with a deep longitudinal groove.

2. Chelonemys.

Head elongate ovate; the alveolar surface of the upper jaw rather sinuous, convex in front and shelving behind, with two diverging ridges, separated by a broad longitudinal depression, the inner one low and indistinct. Lower jaw with a sharp outer edge and a deep longitudinal concavity, the inner margin elevated, divided by a central longitudinal groove into two ridges; the central notch produced forward between the under margin towards the apex of the central beak. (Cuvier, Oss. Foss. v. part 2, pl. 11. figs. 11, 12.)

C. dumeriliana, Gray, Suppl. Cat. Sh. Rept. p. 83. B.M.

3. Podocnemis.

Head short and broad; alveolar surface of upper jaw flat, with three diverging ridges, separated by a flat rugose space in the middle, the inner one low and distinct; lower jaw with a sharp outer edge, a deep longitudinal concavity, the inner margin elevated, divided

by a central longitudinal groove into two ridges; the central notch not produced forward. (Gray, Cat. Sh. Rept. tab. 37. f. 1.)

The young animal is black, the head ornamented with large white spots.

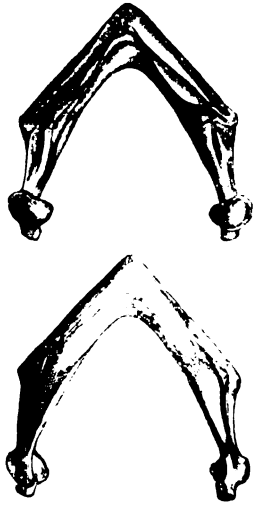
P. EXPANSA, Gray, Suppl. Cat. Sh. Rept. p. 83. B.M.

4. BARTLETTIA.

Head short and broad; alveolar surface of the upper jaw flat in front, shelving and concave behind, with a very indistinct, short, subcentral ridge parallel to the outer margin; alveolar surface of the lower jaw with a slightly raised ridge on the outer edge, narrow, slightly concave in front, the inner edge obliquely raised into a sharp ridge, which is wide behind and narrow in front, with a rounded depression in the centre of the hinder edge (fig. 1). The central ridge in the horny beak of the upper jaw more distinct than in the skull.

The skull (fig. 2, p. 721) is short and depressed, the eyes separated, forehead convex; the head covered with hard shields, the crown-shield rounded in front, temporal shields large; chin with a single central beard; the cheek-shield covering part of the temporal muscle not covered by the bone. The animal olive, and the head not spotted.

Fig. 1.



Lower jaw of *Bartlettia pitipii*.

BARTLETTIA PITIPII. B.M.

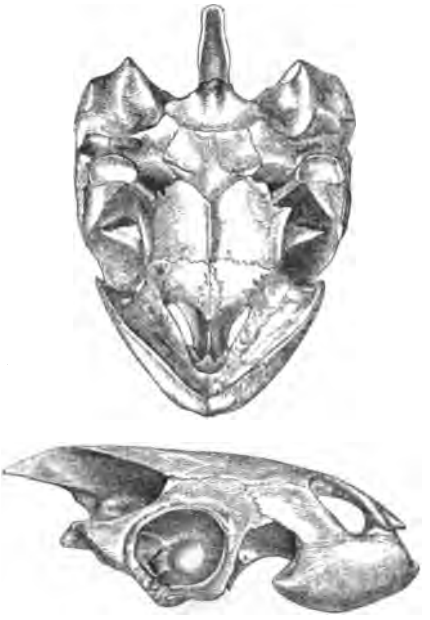
Shell olive-brown, ovate, hinder margin greatly expanded; the head olive above, rather paler below; the second and third vertebral

shields bluntly keeled, the keel most elevated on the suture between these two shields.

The sternum paler; the limbs, in spirit, pale yellowish white.

Hab. Lakes of the Upper Amazons (*Edward Bartlett*): called "Pitipii."

Fig. 2.



Skull of *Bartlettia pitipii*.

There are four specimens in the British Museum, the largest being 13 inches by 11 inches, and one has been prepared as a skeleton.

The shell is very like that of *Podocnemis expansa*; but the largest specimen we have of the latter is 31 inches long by 23 inches.

I have named this genus after Mr. Bartlett, the Superintendent of the Gardens of the Zoological Society, who has published several excellent papers on the manners, and habits, and growth of the animals under his care. It is only to be regretted that he has not printed more of his notes; for observations on these subjects from a person who has the power of accurately observing and duly estimating the importance of the facts observed, as Mr. Bartlett has shown that he possesses, are most valuable for science; such observations can only be made by one who has the animals constantly under his supervision, while the separation of the species, and the systematic zoological characters, are able to be best eliminated in extensive collections in museums.

8. Notes on the Species of *Rhinoclemmys* in the British Museum. By J. E. Gray, F.R.S. &c.

Having received two or three specimens of this genus, with the heads in a good state, I have been induced to compare the heads of all the species, as I believe that the colouring of this part affords good specific characters. I append a short description of the head of each species, and a figure showing the character of the markings.

Fig. 1.



Rhinoclemmys melanosterna.

Rhinoclemmys melanosterna. (Fig. 1.)

Head black; crown deep black, with a narrow, opaque, white streak from the nostrils over the eyes to the upper part of the temples, a broad, pale, indistinct streak from the middle of the orbit to the front of the tympanum, and a small spot beneath it on the hind edge of the orbit.

Fig. 2.



Rhinoclemmys scabra.

Rhinoclemmys scabra. (Fig. 2.)

Head black above; a round white spot on each side of the nose in front of upper edge of the orbit, with a white diverging streak on each side of the crown, commencing even with the middle of the upper part of the orbit, and extending to the temple, and with a small white spot on each side of the occipital edge of the crown; temples with a white streak from the middle of the back edge of the orbit, another from the lower part of the back edge of the orbit, both extending towards the ear, with two or three small spots between them; a third larger streak from the underside of the orbit, which is forked behind, one branch ascending and the other descending to the edge of the lower jaw, and with a round spot behind the fork; the chin white; the sides of the neck with numerous black and white streaks; the fore legs black, with a broad white streak down the

middle of each series of scales, extending along the upperside of each toe.

Fig. 3.



Rhinoclemmys scabra, var.?

RHINOCLEMMYS SCABRA, var.? (Fig. 3.)

With all the marks of the preceding; but the spots on the front of the eye are smaller, and the two diverging streaks are united together by a broad cross band on the front of the crown, just level with the back edge of the eye; the spots on the occiput are larger and longer, forming short streaks; the marks on the temple are similar, and not quite like the former.

There are two very young specimens of this variety in spirits, which are quite alike as regards the bands on the crown; but they differ a little in the distribution of the streaks on the sides of the temples.

Fig. 4.



Rhinoclemmys mexicana.

RHINOCLEMMYS MEXICANA. (Fig. 4.)

Head brown; crown with a broad, uniformly wide, semicircular band over the eyes; the sides of the head varied with yellow, and dotted with black; the chin and throat yellow, black-dotted.

RHINOCLEMMYS ANNULATA. (Fig. 5.)

Crown white, varied with black, forming rather a radiating symmetrical figure on the back of the crown, and with a white cross band on each side of the occiput; the temples with a broad white streak from the back edge of the orbit, and another from the front edge of the orbit, which are united together on the tympanum by a perpendicular streak behind, and then give off a streak that is continued along the side of the neck; the sides and back of the neck black, with several broad white streaks, one arising from the centre

of the occiput, another wider from the outer margin of each side of the occiput; two narrow indistinct streaks in front of the orbit, on the upper edge of the side of the nose; fore feet with two white streaks.

Fig. 5.



Rhinoclemmys annulata.

9. List of Diurnal Lepidoptera collected by Mr. Spaight in Northern India. By Arthur G. Butler, F.L.S. &c.

The Rev. A. B. Spaight, late Missionary to Moultan, has forwarded to me a small collection of Butterflies taken by himself in the district of Jhelum on the Punjab. Although this collection consists of only 25 species, it represents all the 5 families of Diurnal Lepidoptera, in the following proportions:—

Nymphalidæ	3	subfamilies,	5	genera,	7	species.
Erycinidæ	1	,,	1	,,	1	,,
Lycænidæ	1	,,	1	,,	2	,,
Papilionidæ.....	2	,,	8	,,	13	,,
Hesperidæ	1	,,	1	,,	1	,,
	8	,,	16	,,	24	,,

The collection is accompanied with exact localities and a few notes on habits, &c.

Family Nymphalidæ, Westw.

Subfamily Danainæ, Bates.

Genus Danais, Latreille.

1. Danais chrysippus.

Papilio chrysippus, Linn. S. N. ii. p. 767 (1766).

"Taken on flowers in Government garden at Gujerat."

2. DANAIS PHILENE.

Papilio philene, Cramer, iii. pl. 275. figs. A, B (1782).

"In garden of lime- and orange-trees at Cheta, about 20 miles from Murri."

3. DANAIS LIMNIACE.

Papilio limniace, Cramer, Pap. Exot. i. pl. 59. figs. D, E (1779).

"On blue flowers in gardens at Gujerat and Cheta."

In consequence of the exaggerated colouring of some of Cramer's figures, I mistook the species represented on pl. 59 for another common insect inhabiting nearly the same districts, but identical with the *Euplœa hamata* of M'Leay; I therefore redescribed the true *P. limniace* in my Monograph (P. Z. S. 1866, p. 52) as *Danais leopardus*, with a query as to whether it was a variety of *D. limniace*. As the number of examples taken by Mr. Spaight show no variation in pattern or coloration, we may conclude that the two species are distinct.

Subfamily SATYRINÆ, Bates.

Genus LETHE, Hübner.

1. LETHE DYRTA.

Debis dyrta, Felder, Reise der Novara, iii. p. 497. n. 860 (1867).

"Murri."

As I have not examined the type of *L. drypetis*, I feel uncertain as to whether *L. dyrta* is or is not a slight variety of that species. Our specimens agree best with Dr. Felder's description; and therefore I adopt his name.

Subfamily NYMPHALINÆ, Bates.

Genus PYRAMEIS, Hübner.

1. PYRAMEIS CARDUI.

Papilio cardui, Linn. S. N. ii. p. 774. n. 157 (1766).

"Jhelum (town), on flowers, and at Murri."

Genus ARGYNNIS, Fabricius.

1. ARGYNNIS NIPHE.

Papilio niphe, Linn. S. N. ii. p. 785 (1766).

"On flowers in garden at Gujerat."

Genus ATELLA, E. Doubleday.

1. ATELLA PHALANTHA.

Papilio phalantha, Drury, Ill. i. pl. 21. figs. 1, 2 (1779).

"Murri."

Family Erycinidæ, Westwood.

Subfamily Libytheinæ, Bates.

Genus Libythea, Fabricius.

1. Libythea lepita.

Libythea lepita, Moore, Cat. Lep. E. I. C. i. p. 240. n. 519 (1857).
"Murri."

Family Lycænidæ, Stephens.

Subfamily Lycæninæ, Butler.

Genus Lycæna, Fabricius.

1. Lycæna kasmira.

Lycæna kasmira, Moore, P. Z. S. p. 503, pl. 31. fig. 1 (1865).
"Murri."

2. Lycæna, sp.? (near *L. laius*, Cr.).
"Murri."

Family Papilionidæ, Doubleday.

Subfamily Pierinæ, Bates.

Genus Synchloë, Hübner.

1. Synchloë gliciria.

Papilio gliciria, Cramer, Pap. Exot. ii. pl. 171. figs. E, F (1779).
"Taken on flowers at Gujerat."

2. Synchloë nepalensis.

Pieris brassicæ, var. *nepalensis*, G. R. Gray, Lep. Ins. Nepal, p. 9, pl. 6. figs. 1 & 3 (1846).
"On flowers at Gujerat."

Genus Belenois, Hübner.

1. Belenois mesentina.

Papilio mesentina, Cramer, Pap. Exot. iii. pl. 270. figs. A, B (1782).
"On flowers at Gujerat."

Genus Teracolus, Swainson.

1. Teracolus etrida.

Anthocharis etrida, Boisduval, Sp. Gén. Lép. i. p. 576 (1836).
"Murri."

Genus Colias, Febricius.

1. Colias fieldii.

Colias fieldii, Ménétriés, Enum. Corp. Anim. i. pl. 1. fig. 5 (1855).
"Murri."

2. COLIAS SIMODA.

Colias simoda, De l'Orza, Lép. Jap. p. 10. n. 21 (1869).

"Murri."

I think it doubtful whether this is more than a modification of *C. hyale*.

3. COLIAS HYALE.

Papilio hyale, Linnæus, S. N. ii. p. 764. n. 100 (1766).

"Murri."

Genus CALLIDRYAS, Boisduval.

1. CALLIDRYAS CATILLA.

Papilio catilla, Cramer, Pap. Ex. iii. pl. 229. figs. D, E (1781).

"Gujerat; always settles on a wild plant, which (with its wings closed) it exactly resembles."

2. CALLIDRYAS PYRANTHE.

♂ var. *Papilio ilea*, Fabricius, E. S. Suppl. p. 421. n. 587, 588 (1798).

"On flowers in Government garden at Gujerat."

Genus GONEPTERYX, Leach.

1. GONEPTERYX RHAMNI.

Papilio rhamni, var. *nipalensis*, G. R. Gray, Lep. Ins. Nepal, pl. 5. fig. 1 (1846).

"Murri."

This only differs from the European *G. rhamni* in the more deeply sinuated anal margin of the hind wings.

Genus TERIAS, Boisduval.

1. TERIAS HECABE.

Papilio hecabe, Linnæus, S. N. ii. p. 763 (1766).

"In garden at Gujerat."

2. TERIAS BLANDA.

Terias blanda, Boisd. Sp. Gén. Lép. p. 672. n. 32 (1836).

"In garden at Gujerat."

Subfamily PAPILIONINÆ, Bates.

Genus PAPILIO, Fabricius.

1. PAPILIO ERITHONIUS.

Papilio erithonius, Cramer, Pap. Exot. iii. pl. 232. figs. A, B (1782).

"Common on flowers at Gujerat and at Cheta, about 20 miles from Murri."

Family HESPERIDÆ, Leach.

Subfamily PAMPHILINÆ.

Under this heading I would include all the genera having a short thick club of the *Pamphila* type to the antennæ, and terminating at a right angle in a short pointed hook, such as *Proteides*, *Carystus*, *Pamphila*.

Genus PAMPHILA, Fabricius.

1. PAMPHILA MATHIAS.

Hesperia mathias, Fabricius, E. S. Suppl. p. 433. n. 289, 290 (1798).

"Gujerat, on flowers."

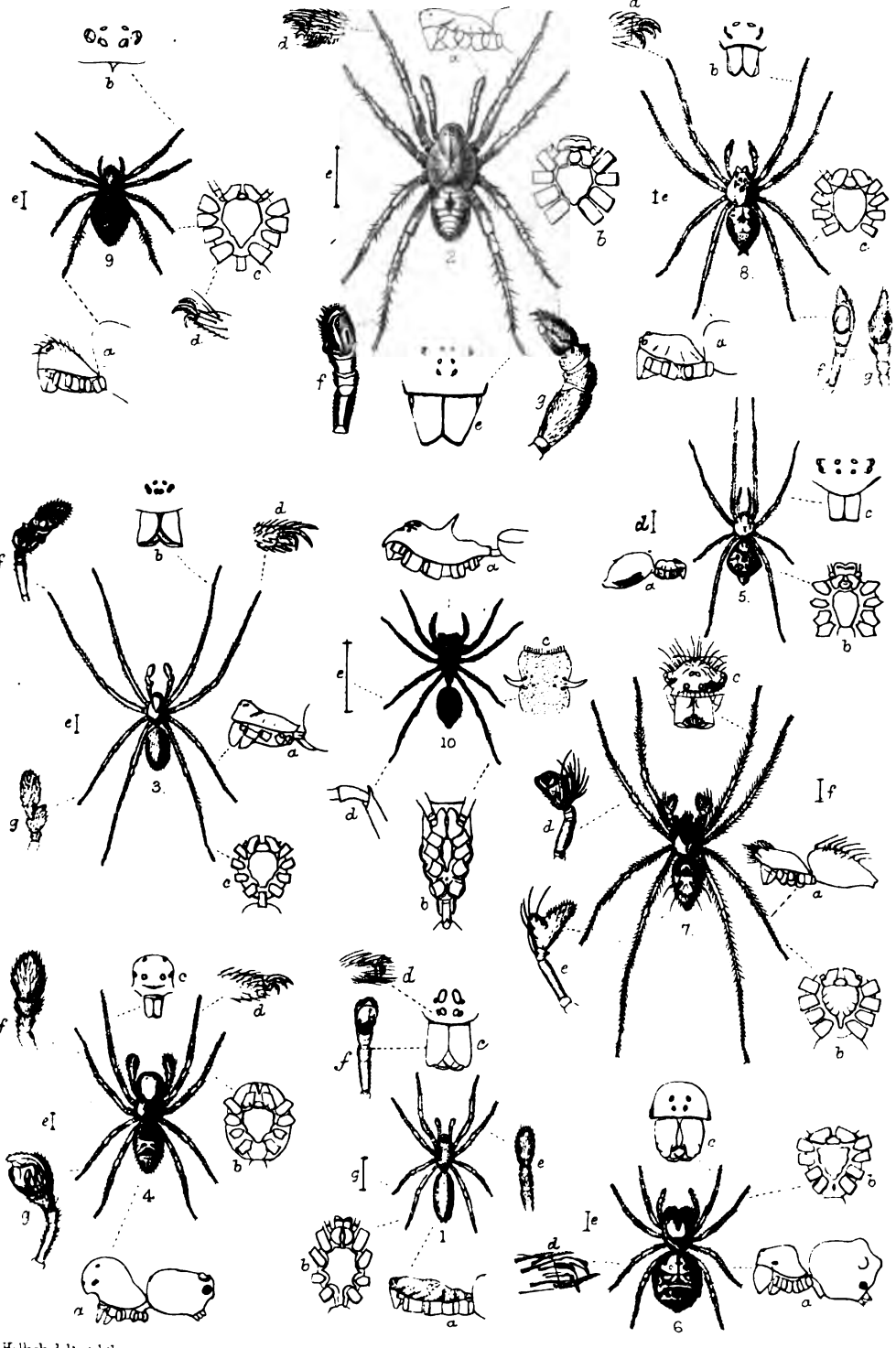
10. On some new Genera and Species of *Araneidea*. By the Rev. O. P. CAMBRIDGE, C.M.Z.S.

(Plate XLIV.)

Among the Spiders described in the present paper are several of the greatest possible interest to the scientific arachnologist. We find one (*Stenochilus hobsonii*) presenting the almost unique character of possessing but *two* spinners*; another (*Aphantochilus rogersii*), from Minas Geraes, Brazil, appears to be entirely without the *labium*, a portion of structure the absence of which is, I believe, unknown in any genus of Araneidea at present characterized. The resemblance of this Spider to some of the large-headed, horny, spine-bearing Ants of South America is very striking, and forms an unmistakable instance of similarity between individuals of two very widely separated groups of the Articulata. This similarity no doubt carries with it some advantage to one or the other—probably to the Spider, as being the most likely of the two to derive advantage from such a resemblance—which doubtless sums up a long succession and progress of small advantages. It is unfortunate that the term *mimicry* should have been given to this and other like curious resemblances, since that term seems to many naturalists to imply consciousness or volition on the part of the creature supposed to be the one which resembles another; and this certainly unfounded implication casts discredit upon the deep natural truth which the resemblance embodies.

Another of the Spiders (*Moneta spinigera*) described below, is interesting as affording a tolerably certain clue to the family affinities of a small group (*Scytodes* and *Omosita*) which has appeared to me widely separated hitherto from the Theridides, with which family the genus *Moneta* seems to connect it. I observe, however, that in a work on European Spiders just published, Dr. T. Thorell, of Upsala, places this group side by side with the family

* Another instance of this peculiarity is found in the genus *Palpimanus* (Dufour).



A. T. Hollick del. et lith.

New Genera & Species of Araneidea

Theridioidæ, in the suborder *Retitelariæ*, which substantially accords with my own present view of its systematic position. Several others of the genera now characterized it is exceedingly difficult to assign with certainty to any family groups hitherto established: a knowledge of their habits would, of course, be a great assistance in relegating them to their proper groups, though even this is not always to be relied upon as conclusive in determining the *family* of a Spider (see remarks on nov. gen. *Rhion*, postea, p. 742). In none of those now described, however, is any thing known, either of habits or habitat, beyond the mere locality in which they were captured; we have therefore nothing but *structure* to guide us; and the general form resulting from their structure is in several of the present species very far removed from the typical forms of the families to some recognized genera of which they seem in other respects to be related. It is unnecessary to enter into details in this short introductory notice, as remarks on the above point will be found appended to the descriptions of such as appear to be doubtful in their systematic allocations. It is, perhaps, only necessary to add here that, of the Spiders forming the ten new genera now proposed, *six* were received from Messrs. J. Nietner and G. H. K. Thwaites, of Ceylon, *one* from Bombay, from Major Julian Hobson (H.M. Staff Corps), one from Natal, and two from Sta. Fé, Minas Geraes (captured there by Mr. Henry Rogers, of Freshwater, Isle of Wight, and his son, now on a collecting expedition in Brazil).

Fam. Drassides?

Nov. gen. Stenochilus (*στενός*, narrow, *χεῖλος*, lip, *labium*).

Characters of the Genus.—*Cephalothorax* elongate-oval, or, rather, somewhat attenuated diamond-shaped, strongly emarginate or indented on the lateral margins.

Eyes eight, very unequal in relative size, situated in two transverse rows at the fore extremity of the caput, curved away from each other, but forming a compact and almost circular group.

Maxillæ constricted at their base, enlarged in a circular form at the middle on their outer sides, and curved over and inclined towards the labium, over which their pointed extremities almost touch each other; they are also indented or impressed somewhat transversely near their middle.

Labium long, narrow, sharp-pointed at its apex, and a little wider near the middle than at the base.

Legs rather short, and differing but little in relative length, which appears to be 4, 1, 2, 3; each tarsus ends with two longish curved claws, minutely pectinate towards their base, and springing from a sort of heel or minute supernumerary joint.

Abdomen narrow, elongate-oval; *spinners* two only, short, rather strong, and biarticulate.

Stenochilus hobsonii, n. sp. (Plate XLIV. fig. 1.)

Male adult, length 2¾ lines, of cephalothorax 1⅓ line.

An immature male (owing to the greater length of the abdomen) measured 3½ lines in length.

The *cephalothorax* has the upper marginal profile line, of both the caput and thorax, level; the normal indentations are strong and form the emarginate appearance of the lateral edges; its colour is a bright orange-red; it is thickly impressed with minute punctures, and furnished thinly with fine greyish hairs.

The *eyes* are eight in number; the two outer ones of each row are contiguous to each other, and thus the eight form four pairs occupying the four corners of the ocular area; the two central eyes of the hinder row are the largest of the eight; they are of an oval shape, grey in colour, and separated from each other by the space of an eye's diameter; the two fore centrals are next in size, round in form, dark-coloured, and not more than half an eye's diameter apart from each other; the four lateral eyes are the smallest, nearly equal in size, and of a pearly white lustre; the height of the clypeus (*i. e.* the space between the lower margin of the fore central eyes and the insertion of the falces) is rather more than the diameter of one of those eyes.

Legs: those of the first and second pairs are much the strongest (especially the coxal and femoral joints); their colour is orange-yellow, and they are furnished only with fine hairs.

Palpi short, similar in colour and armature to the legs; humeral joints much bent; cubital and radial joints short, about equal in length and strength; the latter (radials) are very slightly produced in a pointed form at their outer extremities; the digital joint is rather large, suffused with a brownish hue, and of an oval form. The palpal organs are neither very prominent nor complex; they consist of simple corneous lobes or processes, with a rather strongish prominent point near their centre.

Falces moderately long, not very strong; they are of a conical form, vertical in position, and furnished at their extremities with a weakish curved fang; their colour, together with that of the *maxillæ* and *labium*, is similar to the colour of the cephalothorax.

Sternum oval, with indented margins, and with a small, narrow, somewhat oblong production at its hinder extremity; in colour it is similar to the maxillæ and labium.

Abdomen long, narrow-oval in form, and moderately convex above; it is of a warm pinkish-red colour, and rather thickly clothed with short hairs of a dull brownish yellow; an apparent pedicle, which, however, is only the prolongation of the hinder extremity of the cephalothorax, connects it with that part; the spiracular plates are yellow, and the spinners two only.

An adult and an immature male of this species were contained in a collection of Spiders most kindly made for me in Bombay, in 1863, by Captain (now Major) Julian Hobson (of H.M. Staff Corps), after whom I have great pleasure in naming it. It is a remarkable Spider, not only from the form of the cephalothorax, maxillæ, labium, and position of the eyes, but especially from the possession of but *two* spinners, in which, as also in the form of the maxillæ and the

greater relative strength of the coxal and femoral joints of the fore legs, it shows an evident affinity to Spiders of the genus *Palpimanus* (Duf.), although differing from them remarkably in the contour of the cephalothorax and some other characters. I have placed the genus *Stenochilus* provisionally, though doubtfully, in the family *Drassides*.

Fam. AGELENIDES.

Subfam. LACHESINA* (Cambr.)

Nov. gen. CYDIPPE (nom. propr.).

Characters of the Genus.—Cephalothorax oval, broader behind than before; caput full and bluff before, sloping forwards and rounding off to the clypeus, which is of considerable height.

Eyes eight, small, and not differing much in size, situate on the fore slope of caput in *three* transverse lines (2, 2, 4). Those constituting the first two rows form nearly a square, whose foremost side is rather wider than its hinder one; the third row consists of *four* eyes in a very slightly curved line (the curve directed forwards) greatly exceeding the other two lines in length; the figure thus formed by the eyes is somewhat of a T shape.

Legs strong and moderately long, their relative length being 4, 3, 1, 2; between 1 and 2 there is but little difference in length; each tarsus ends with *three* curved claws, of which the upper ones are the largest, and have some strong pectinations underneath towards their base.

Maxillæ short, strong, greatly enlarged at their base, curved, and inclined towards the *labium*, which is broader at its apex than at the base, its upper half being nearly semicircular.

Sternum short, broad, and somewhat heart-shaped.

CYDIPPE UNGUICULATA, nov. sp. (Plate XLIV. fig. 2.)

Male adult, length 4½ lines, length of cephalothorax 2½ lines.

The *cephalothorax* is much narrower before than behind, but has no sudden lateral compression at the caput; its colour is a dark shining chestnut-brown; and it is clothed with a very few fine hairs and bristles, chiefly on the caput; the normal furrows and indentations are distinct though slight, that at the junction of the caput with the thoracic segments being the deepest; the profile line shows a wider depression about the middle; otherwise the surface of the cephalothorax is smooth, even, and generally rounded off.

The *eyes* form three transverse rows about equidistant from each other; the two foremost of these rows are short, and consist each of two eyes; the hinder one is long and consists of *four* eyes; those of the foremost row are the largest, and the two centrals of the hinder row the smallest of the eight; the eyes of the first two rows, together with the two hind central eyes, form two nearly straight

* Subfam. *Lachesina* comprises the genera *Lachesis* (Savign.), *Storena* (Walck.), and *Cydippe* (Cambr.).

equally divided longitudinal lines, which converge as they run backwards. The height of the clypeus exceeds by a little the length of these lines; the lateral eyes of the hinder row are widely separated from the central pair, and are situated a little further backwards, forming a longer line than the longitudinal ones above mentioned.

The *legs* are of a dark yellowish-brown colour, tinged with olive-green, the femora and the undersides of the tibiæ being the darkest; they are furnished with hairs and spines varying in length and strength, mostly on those of the two hinder pairs; the tarsi terminate with three claws.

The *maxillæ*, *labium*, and *sternum* (whose form and structure are given in the generic characters) are of a yellow-brown colour, the maxillæ being tinged with olive.

The *palpi* are short and strong; the humeral joints are much enlarged, or tumid beneath and on the outer sides of their hinder part; the cubital and radial joints are equal in strength, the former being rather the longest; these two fit closely to each other, and the latter has a bifid prolongation at its outer extremity; the upper limb of this prolongation is much the longest, and its point is corneous, bluntish, and bent downwards; the *digital* joint is strong and rather long, exceeding in length the radial and cubital joints together; it has a slight lobe at its hinder extremity on the outer side, close beneath the projection on the radial joint; it is thinly furnished with fine hairs, and has at and near its extremity several strong curved claws or talons of different sizes; in colour the palpi resemble the legs, the digital joints being of a deep chestnut-brown approaching to black. The palpal organs are well developed, but not complex, consisting of a long, oval, corneous lobe, divided longitudinally by a deep cleft near its outer margin.

The *falces* are long, strong, and conical, a little inclined backwards to the labium, furnished with short hairs, and similar in colour to the sternum.

Abdomen oval, very convex above, and greatly projecting over the base of the cephalothorax; it is clothed sparingly with hairs; its sides and underside are nearly black; almost the whole of the upper side is occupied by a broad pale orange-yellow band, somewhat indented or irregular on its outer margins, enlarging about the middle and narrowing towards the spinners; the yellow band is charged with a longitudinal somewhat oval patch of blackish colour on its fore part, and this is followed by several transverse curved dusky bars between the blackish patch and the *spinners*; these latter (six in number) are short and not very strong, those of the superior pair being the strongest.

An adult male received from Natal, Africa.

This genus, founded on the very distinct and fine Spider above described, is closely allied to *Lachesis* (Savigny) and *Storena* (Walck.), but may be easily distinguished by the position of the eyes, which differs remarkably from that of those genera. As a species it is strongly characterized (in the male sex at least) by the

peculiar and almost unique powerful claws or talons at the extremity of the digital joints of the palpi.

Fam. Theridides.

Nov. gen. Sphecozone (σφήξ, a wasp, ζώνη, waist).

Characters of the Genus.—Cephalothorax separated from the abdomen, to which it is joined by a distinct stem or pedicle; caput rather elevate; clypeus impressed below the eyes.

Legs long and slender; relative length 4, 1, 2, 3,—4 and 1 being nearly equal; each tarsus ends with three claws, the palpus in the female being without any terminal claw.

Eyes not very unequal in size, situated in two transverse curved rows (or four pairs) on upper fore margin of caput; those of each lateral pair are contiguous to each other and seated on a slight tubercle; those of the two central pairs form an oblong figure, whose fore side is much the shortest.

Maxillæ moderately long, nearly straight, but considerably inclined towards the labium, dilated at their bases, and somewhat pointed at extremities on inner side.

Labium short, small, and apparently nearly semicircular in form.

Sphecozone rubescens, n. sp. (Plate XLIV. fig. 3.)

Male adult, length 1½ line; female adult, 2 lines.

The *cephalothorax, falces, maxillæ, labium, sternum,* and part of the femora of the legs are of a bright red-brown, tinged with orange; the rest of the legs, the palpi, and (in the female) the caput, falces, maxillæ, and labium are strongly suffused with black. The abdomen is of a bright pinkish or cinnamon-red, the colour of the petiole by which it is joined to the cephalothorax being similar to that of this latter part; the abdomen is oblong-oval in the male, but shorter and more convex in the female; it is glossy, sparingly clothed with fine hairs, and has 4–5 slender, pale angular lines or chevrons in a longitudinal series, spanning the hinder half of the upperside; these lines are probably very indistinct, even if visible at all, when alive, but are sufficiently well-marked when in spirit of wine; the hinder extremity of the abdomen is tipped with black; and the spinners are of a dusky yellow-brown colour, suffused with blackish; the form of the *cephalothorax* is oval, the caput being raised above the level of the thorax; the clypeus is high, its height considerably exceeding the length of the space occupied by the four central eyes, and nearly (if not quite) equal to the length of the line formed by the first row.

The *legs* are sparingly furnished with hairs and a few slender nearly erect bristles.

The *palpi* are moderate in length, the humeral and cubital joints being slender, the latter short; the radial joints are large and of very peculiar form, difficult to describe and best conceived from the figures; they are of an irregular cup- or calyx-shape, with the digital

joint springing from the centre of its hollow; this latter (digital) joint is large and of oval form, with an elongation behind, by which it seems to adhere to the radial joint. The palpal organs are well developed, but not very complex; they consist of two largish lobes, with one or two corneous processes or spines at their extremity.

The *falces* are moderately long and strong, a little divergent at their extremities, enlarged or prominent in front on the outer sides; they terminate with a not very strong curved fang, and are armed with several sharp teeth near their extremities on the inner side.

Sternum broad, convex, heart-shaped, and glossy, furnished with a few longish erect bristly black hairs.

The adult female is larger than the male, but resembles it in colour, excepting the dark caput, falces, and maxillæ; the epigyne is also of a deep reddish brown, nearly black.

Two adult females and an adult male of this Spider were lately received from near Sta. Fé, Minas Geraes, Brazil, where they were captured by Mr. Henry Rogers. Had it not been for the excessive slenderness of the legs, and the distinct joint or petiole by which the cephalothorax and abdomen are connected, this species could hardly have been excluded from the genus *Erigone* (Savig.), to which in other respects it bears the closest resemblance.

It must be exceedingly Ant-like when alive; and in general form it bears considerable resemblance to certain of the genus *Micaria* (fam. *Drassides*); but the difference in the form of the caput and other characters separate it easily from that genus.

It is evidently allied to "*Formicina*" (Canestrini), but differs in the *petiole* and relative lengths of the legs, as well as in other particulars.

As far as my own experience goes, this Spider is more nearly allied to the almost exclusively northern genus *Erigone* than any other known tropical Spider; and possibly it may prove to be the type of a more or less numerous closely allied exotic group. Its bright colours contrasted with the black caput and tip of the abdomen, together with its slender legs and waist, make it a very striking and pretty species.

Nov. gen. CEPHALOBARES (κεφαλή, head, βαρύς, heavy).

Characters of the Genus.—*Cephalothorax* short, nearly round at its lower margins; *caput* large, abnormally elevated and convex, rounded on all sides, and projecting greatly over the falces.

Eyes not very unequal in size, forming four pairs on the fore part of the caput; the four centrals form a large square, whose fore side is the shortest; and on either side of the lower part of the square are the two lateral pairs, the eyes of each of which are contiguous to each other, and seated on a very slight tubercle.

Legs short, moderately strong, not greatly unequal in length; relatively 1, 4, 2, 3; the tarsal claws three in number and very minute.

Falces small, moderately long, straight.

Maxillæ moderate in length and strength, slightly inclined to the

labium, rounded off on their *outer* and pointed on their *inner* extremities.

Labium very short, broad, and somewhat semicircular in form.

Sternum of a somewhat triangulated heart-shape.

Abdomen oval, cylindrical; its upper extremities projecting over the spinners.

CEPHALOBARES GLOBICEPS, n. sp. (Plate XLIV. fig. 4.)

Male adult, length 1¼ line.

The *cephalothorax, falces, maxillæ,* and *labium* are of a brown colour tinged with yellowish; the former is clothed with a few pale hairs; and the normal grooves and indentations are amost obsolete, the *caput* being apparently the elevation of almost the whole cephalothorax; in fact this part seems to have run entirely to caput, which is broad, rounded, and so considerably elevated and prominent that the clypeus is overhung and partly *underneath* the fore part of the caput; the cephalothorax thus reminds one of some of the species of *Erigone* (*Walckenaera*), especially *W. humilis* (Bl.) and *W. affinitata* (Cambr.).

The *eyes* occupy a large area, being spread out over the fore part of the caput in the form stated in the "generic characters" above; those of the fore central pair are dark-coloured and slightly the largest of the eight; those of the lateral pairs are the smallest, and with those of the hind central pair are pearly white.

Legs pale yellow, broadly banded with bright orange-red, and furnished sparingly with short hairs.

Palpi short, of a yellow-brown colour, except the digital joints, which are dark brown; the cubital is shorter than the radial joint, which is large, expanding forwards, and somewhat produced at its upper extremity over the base of the *digital* joint, which last is of a short oval form; the palpal organs are well developed, but not very complex, being very similar in general form and structure to those of many typical species of "*Theridion*."

The *abdomen* is of an oblong or somewhat oval-cylindrical form, and does not project over the base of the cephalothorax; it is sparingly clothed with hairs, and is of a pale yellowish-white colour; the upperside has an indistinct pattern, and the sides are also marked with longitudinal striations of a deep brown colour; the hinder part of the abdomen is bluff and abrupt, and projects over the spinners; this bluff portion has four rather conspicuous dark shining tubercular patches forming nearly a square, whose area is tinged with pinkish red; the underside and around the spinners are also strongly tinged with the same colour.

An adult male of this Spider was contained in a fine collection of Araneidea kindly made for me in Ceylon by Mr. G. H. K. Thwaites, during the past year. Although generically closely allied to *Theridion*, it was impossible to include it satisfactorily in that genus; the shortness of the legs, the extraordinary form of the caput, as well as differences in the structure of the more ordinary generic parts, made it necessary to construct a new genus for its reception.

Fam. THERIDIDES.

Subfam. SCYTODINA* (Cambr.).

Nov. gen. MONETA (nom. propr.).

Characters of the Genus.—Cephalothorax rather elevated or gibbous at the thoracic part, lower and flattened before; of a short oval form, narrowest in front, with but a very slight lateral compression at caput.

Abdomen somewhat of a quadrangular form, broader behind than before, with a median cylindrical prolongation from its hinder extremity, terminating with the spinners.

Eyes eight, rather unequal in size, in two nearly straight parallel rows, spanning the greater part of the width of the caput, and having a prominent but flattened clypeus; the exterior eyes on either side are seated on a strongish tubercular elevation.

Maxillæ rather long, strong, enlarged at the base, curved and inclined over the labium, and rounded(?) at the extremities.

Labium short and somewhat semicircular in form.

Sternum rather long, and much resembling the form of a kite with its sharp end truncated.

Legs long, slender, furnished sparingly with hairs and slender bristles; the tarsi (which are very short) terminate with three claws; relative length of the legs 1, 4, 2, 3.

MONETA SPINIGERA, n. sp. (Plate XLIV. fig. 5.)

Female adult, length 1½ line.

The thoracic portion of the cephalothorax is slightly humped or gibbous, and the caput depressed; its colour is a clear yellow-brown, with the margins, a series of irregular patches just above them, and a median longitudinal line of brown-black; the clypeus is prominent.

The *eyes* are placed in two transverse parallel rows of equal length, or in four pairs; those of the two central pairs form very nearly a square; those of the fore central pair are very small and the smallest of the eight, and are a little further apart than those of the hind central pair, but nearer to each other than each is to the lateral one on its side; those of the lateral pairs are seated respectively on the outer side of a strong and somewhat geminated tubercle, and, as well as those of the hind central pair, have bright pink-red margins; the lateral eyes appeared to be the largest of the eight.

Legs longish and slender, those of the third pair very much the shortest, all with unusually short tarsi; they are of a yellowish colour, tinged with brown, marked and faintly banded with darker brown; the legs generally are very thinly furnished with hairs, perhaps rubbed off; but the tarsi, especially those of the hind pairs, have a distinct row of bristles bearing somewhat of a "*calamistrum*" appearance.

* Subfam. *Scytodina* includes the genera *Scytodes* (Latr.), *Omosita* (Walck.), and *Moneta* (Cambr.).

Palpi moderate in length, similar in colour to the legs, and terminating with a rather conspicuous, curved, but simple black claw.

Falces neither very long nor strong; they present no peculiar features, and, together with the maxillæ, labium, and sternum, are rather lighter-coloured than the cephalothorax, the *falces* being also marked near their base on the inner sides with black.

The *abdomen* is of a very peculiar form, somewhat quadrate, or rather subtriangular, the hinder part being much wider than the fore part (which forms the *apex* of the triangle and is truncate); the hinder part has a sort of cylindrical median prolongation; the abdomen is of a dull brown above, marked with darker, and with whitish cretaceous spots disposed chiefly in two irregular longitudinal lines; the sides and hinder part are black, and the underside is of a pale dull brown; the cylindrical prolongation is also of a pale dull brown, with a fine median longitudinal black line, giving off several oblique lateral whitish lines; the spinners terminate this prolongation, and appear to have nothing remarkable in either their size or structure; in the transverse line of the widest part of the abdomen, and in the median longitudinal line of the upperside, is a single, curious, prominent, sharp, but short, beak-like spine directed backwards.

An adult female of this Spider was received in 1869 from Mr. Nietner, from Ceylon, and another in the same year (also from Ceylon) from Mr. Thwaites; it is an interesting species, and appears to furnish a link between the *Scytodides* and *Theridides*. The genus *Moneta* might thus either come at the head of the *Theridides* proper, followed by the genus *Pholcus*, or terminate the subfamily *Scytodina*; the former, however, seems to be its more proper place. Dr. Thorell includes the genus *Pholcus* with *Scytodes* in a subfamily of *Theridides*; but *Pholcus* appears to me to be too decidedly belonging to the family *Theridides*, as formerly constituted, to be placed in the same restricted group as *Scytodes*.

Fam. Epeïrides.

Nov. gen. Chorizoopes (χωρίζω, to divide; ὤψ, ὦπες, the eyes).

Characters of the Genus.—Cephalothorax short, nearly square, with the corners rounded off; the caput occupies almost the whole of the cephalothoracic area, and is very broad and much elevated, the occiput being the highest and most prominent part.

The *abdomen* is short, broad, and nearly as high as long; it is bluff and a little larger behind (where it has some small subconical eminences) than before.

Eyes eight; four in a small quadrangular figure in front of the caput, and a pair on each side, far removed from the central four, and close upon the lateral margin of the caput.

Legs short, moderately strong; relative length 4, 1, 2, 3, but very little difference between them; tarsal claws three in number, small, and toothed at their base; opposed to them are some supernumerary pectinated ones.

Maxillæ rather strong, greatly bent (in an almost angular form) over the labium.

Labium of a somewhat triangular form, broader in the middle than at its base, and pointed at the apex.

CHORIZOOPES FRONTALIS, n. sp. (Plate XLIV. fig. 6.)

Female adult, length 1½ line.

The general form and structure of this Spider have been sufficiently described above. The *caput* has the occipital portion prominent on either side, and a depression where it joins the thoracic part; the normal furrows and indentations are obliterated owing to the abnormal development of the caput, which usurps almost the whole cephalothorax.

The *cephalothorax* is sparingly clothed with pale grisly hairs of a more or less dark yellow-brown colour; the region of the occipital prominences being palest.

The *eyes* do not differ greatly in size: the upper ones of the central quadrangular group are the largest, and those of the lateral pairs the smallest of the eight; the eyes of each of these latter pairs are nearly contiguous, and of a pearly white colour; the others are darker.

The *legs* are of a pale yellow, banded with yellow-brown, and are furnished sparingly with short hairs.

Palpi small, short, furnished with short hairs and a very fine, black terminal claw.

Falces large and strong, rather prominent in front and on the sides, and curved when looked at from before; towards the inner extremity of each is a prominence with a curved margin armed with a sort of comb of close-set longish teeth; the colour of the *maxillæ* is a pale yellowish brown; that of the *labium* and *sternum* being darker.

The *abdomen* is sparingly clothed with very short hairs; it is of a short-oval form and very convex above, bluff and abrupt behind, where it has four, small, bluntish or subconical eminences, arranged in a transverse diamond shape, spanning the whole width of the abdomen; it does not project over the base of the cephalothorax; and its colour is a dull yellowish with a brown tinge, marked with deep black-brown and white, forming a regular pattern, difficult to describe and best seen in the figure; two small white spots (followed by several more minute ones) are rather conspicuous on the upperside; between the spinners and each of the lateral eminences, and not far from the former, is a large, conspicuous, round, black blotch. The epigyne and the orifices of the spiracles are of a deep red-brown colour; the spinners are short, six in number, and not very strong nor conspicuous.

Adult females of this Spider were contained in collections of Spiders from Ceylon, in 1869, both from Mr. Nietner and Mr. Thwaites. I have included it in the family *Epeïrides*, with Spiders of which it is evidently connected, though in the form of the maxillæ and labium it bears strong affinity to the *Theridides*; in whatever family, however, it may finally be placed, there seems to be no

present genus to which it can be referred. Nothing is known of its habits; the wide separation of the three groups of eyes, with the very peculiar form of the cephalothorax and the structure of the maxillæ, make it a remarkable species, and one which, when looked at from in front, might easily be mistaken for a four-eyed Spider.

Nov. gen. ŒTA (nom. propr.).

Characters of the Genus.—Cephalothorax rather depressed above, and rounded on the outer margin; *caput* broad, flattened, and produced in front into three prominent productions, all in the same plane; the central prominence bears the four central eyes at its extremity in the form of a quadrangle, and each of the lateral prominences a lateral pair of eyes.

Abdomen oval, pointed behind, not very convex above, armed on the upperside with tuberculiform spines, mostly surmounted with long and strongish bristles.

Legs rather long, slender, armed tolerably thickly with hairs and long spine-like bristles; tarsal claws three in number, toothed, and with some supernumerary opposed pectinated ones beneath; relative length of legs 4, 1, 2, 3.

Maxillæ strong, moderately long, inclined towards the labium, and obliquely truncate, rather on the outer sides, at their extremities; inner extremities pointed.

Labium short, broad, and apex curved.

ŒTA SPINOSA, n. sp. (Plate XLIV. fig. 7.)

Male adult, length 1½ line.

The *cephalothorax* has the thoracic region of a yellow colour; the normal grooves and indentations are fairly marked; the *caput* is of a deep brown, softening into a pale yellow-brown on the lower margins, and furnished with long bristly hairs; the two lateral projections at its fore extremity are rather pointed, of considerable length, divergent from and rather longer than the central prominence, which is, however, the strongest of the three, obtuse, and slightly impressed at its extremity.

Eyes eight, not very unequal in size; two contiguous to each other are placed at the extremity, on the outer side of and beneath each lateral prominence of the caput; a pair almost (but not quite) contiguous at the base on the upperside of the central prominence, and another pair at its extremity, much wider apart than those of the pair at its base, and, in fact, occupying its fore corners; these four form an oblong rectangular figure whose fore side is much the widest. Except those at the base of the central prominence, which are pearly white, the eyes are of a somewhat amber-colour of different shades.

The colour of the *legs* is pale yellow.

Palpi short, of a yellowish colour; the cubital, radial, and digital joints are dark brown; the *cubital* is short, pointedly prominent above, and has a long and somewhat sinuous dark spiny bristle

issuing from its most prominent part; the *radial* is large, very prominent and obtuse above, somewhat blunt-conical in form, and armed with hairs, long spines, and strong spiny bristles; the *digital* joint is small, oblong-oval; the palpal organs are well developed and complex (though compact), with small corneous processes and spines; these organs are directed outwards and are jammed up against the radial joint, seeming as though issuing from or articulated to it.

The *falces* are set back rather far beneath the fore part of the caput, the clypeus being low and retreating, owing to the prominence of the upper fore part of the caput; they are inclined backwards towards the maxillæ, moderate in length and strength, very slightly divergent and armed near their inner extremities with a row of curved spiny bristles, apparently in place of the teeth usually occupying that situation; the colour of the falces is yellow, tinged with brown, and that of the *maxillæ*, *labium*, and *sternum* is yellow; the form of the sternum is heart-shaped, rather pointedly produced behind.

The *abdomen* is of an oval form, pointed behind; it is of a dull yellow colour, mottled (chiefly on the sides) with cretaceous white; the fore part of the upperside has a broad marginal dark-brown band of a somewhat horseshoe form with bold nail-like points of yellow distributed along it; between the extremities of this band and about the centre of the upperside of the abdomen is a large roundish-oval blotch of the same colour, also charged with some similar yellow nail-like dots; another blackish patch follows each extremity of the horseshoe band, and behind each of these again is another dark dot; from all of these dark markings spring some strong, erect, bluntish spines, varying a little in length and strength, and surmounted with long tapering bristles directed backwards; the spines which issue from the patches immediately succeeding the horseshoe band are the strongest, blackest, and most conspicuous; these are obtuse at their extremities and devoid of a terminal bristle, perhaps accidentally broken off (?).

An adult male of this puzzling Spider was contained in a collection of Spiders received from Mr. Nietner, from Ceylon, in 1869. I am inclined to think that it should be included in the family *Epeïrides*, although the slenderness and armature of the legs, as well as the form of the maxillæ, connect it closely with the *Theridides*; the form of the cephalothorax and the tarsal claws, however, seem to connect it more nearly with the former; in which family I have now provisionally included it. Nothing is known of its habits.

Family —— ?

Nov. gen. Rhion (nom. propr.).

Characters of the Genus.—*Cephalothorax* short, rather flattened above, rounded on hinder margin, and a little compressed laterally at the caput, which is broadish and truncated before.

Eyes six in number, rather large and not greatly unequal in size;

four form nearly a straight row across the upperside of the fore part of the caput; and in front of each lateral eye of this row is another nearly contiguous to it, and about an eye's diameter from the lower margin of the clypeus.

Legs neither very long nor strong; relative length 1, 2, 4, 3, between 2, 3, and 4 there is but very little difference; the metatarsi of the hinder pair are furnished on the outer sides with "calamistra," and the tarsi end with three curved strongly pectinated claws, of which the lower one only appeared to differ from the upper ones in size.

Maxillæ strong and rather long, curved and inclined towards the labium, of nearly equal breadth throughout, and rounded at their extremities.

Labium moderately long, broader near its base than at the apex, which is truncated. A supernumerary mamillary organ, or pair of short united spinners, is situated beneath, or in front of, the usual ones, which are rather strong, prominent, and are projected in the same plane as the abdomen.

RHION PALLIDUM, n. sp. (Plate XLIV. fig. 8.)

Male adult, length $\frac{2}{4}$ of a line.

The general colour of this interesting little Spider is a pale amber-yellow, marked and mottled with cretaceous white; the colour of the cephalothorax is rather deeper and brighter than that of the abdomen, the upperside of which last is almost entirely suffused with white, longitudinally and transversely intersected with yellowish lines; the sides of the cephalothorax are slightly radiated with dusky, the white being principally in the median line.

The four *eyes* of the hinder row are nearly of the same size, the two centrals being nearer to each other than each is to the lateral on its side; the two eyes forming the front row are the largest of the six and widely separated from each other; each is almost, but not quite, contiguous to the hind lateral on its side, with which it is seated apparently on a small common tubercle.

The *legs* are furnished with hairs only; the "calamistra" on the metatarsi of the hinder pair are formed by fine hairs not very thickly set, nor very conspicuous.

The *palpi* are short; the radial is shorter than the cubital, and not quite so strong; it has near its upper extremity, rather on the outer side, a small but short, conspicuous, bluntish-pointed, prominent black spine; the digital joint is longer than the radial and cubital together, it is oval in form and produced at its extremity like the digital joints in the palpi of some species of *Tegenaria*; the *palpal organs* are well developed but simple in structure, consisting apparently of a corneous lobe with a roundish surface, and furnished with a slender black filiform spine, which issues from near their inner extremity, and, curving round on the inner side of the digital joint, terminates in a fine point near their base on the outer side.

Falces moderate in length and strength, and of the ordinary form.

Sternum heart-shaped.

Abdomen short, oval, rather suddenly narrowing near the hinder extremity; it is moderately convex above, and projects slightly over the base of the cephalothorax; some short black bristles are thinly dispersed on its sides, and a few flattened erect ones on its upper-side; of these several in a compact bunch or small group occupy the median line of the fore part; the outer side of each of the superior pair of spinners is black.

A single adult male of this minute Spider was contained in the collection before alluded to, received from Mr. Thwaites of Ceylon. I can hardly venture to pronounce upon its family affinities. It appears to be related to *Tegenaria*, as well as to *Uloborus*, *Mithras*, and *Miagrammopes*; its habits are unknown; but the number and disposition of its eyes and its general characters are interesting, and seem to remove it still further from the family *Epeïrides* than the last three genera above mentioned. These genera, indeed, appear to be attached to that family chiefly, if not entirely, by their common habit of spinning a more or less orbicular snare; this is a character which will, I think, eventually prove of too slender importance, taken by itself, to weigh against strong structural differences. In a most able and important work (before alluded to), 'On the Genera of European Spiders,' by Professor Thorell of Upsala, this author constitutes *Uloborus* and *Mithras* a subfamily (*Uloborinæ*) of the family *Epeïrides*. The distinguishing characters given of the subfamily are strong; and that which unites it to the principal family, being only the form of the snare, seems to me likely to prove untenable. The comparative unimportance of this character is shown by its entire absence in an undoubted Epeïrid lately received from New Zealand, from Dr. Llewllyn Powell, M.D., who kindly favoured me with a sight of some interesting drawings of its snare: this, so far from being in any way geometric or orbicular, greatly resembled that of *Dictyna benigna* (Bl.), but was simpler and more artless. Dr. Powell's Spider is of the genus *Arachnura* (Vins.), a genus of which the typical species is said to weave a geometric snare.

Family Thomisides?

Nov. gen. Phycus (nom. propr.).

Characters of the Genus.—Cephalothorax small, broad-oval; caput large and elevated.

Eyes eight, large, seated in two transverse curved rows and occupying the whole width of the upper fore part of the caput, forming somewhat of a crescent whose horns point backwards.

Abdomen large, short, oval or, rather, heart-shaped, being broad in front and going off on either side in a gradual convex line to a point at the spinners; it is rather convex above, and projects greatly over the base of the cephalothorax, so that the fore margin of the abdomen almost touches the hinder row of eyes, where both it and the cephalothorax are in close contact with each other.

Legs short, strong, tapering, armed with hairs and long slender spines and bristles. Each tarsus ends with three claws.

Maxillæ moderately long, strong, rounded at their extremities, a little curved, and greatly inclined over the *labium*, which is small, short, and subtriangular or somewhat semicircular, with the apex slightly pointed.

PHYCUS BREVIS, n. sp. (Plate XLIV. fig. 9.)

Female, immature, length 1 line.

The general aspect of this Spider is remarkable, owing to its short hunched appearance, the *caput* being large and elevated, while the cephalothorax, as a whole, is small, sloping rapidly and continuously in a slightly hollow line from the summit of the caput to its hinder margin; its colour is deep brown, and the caput is furnished with long curved spiny bristles.

The *eyes* are rather large, nearly equal in size, and form a large crescent; the clypeus is high, slightly prominent below, and exceeds in height the greatest breadth of the crescent formed by the eyes; they are seated on black tubercles, those of the lateral pairs are contiguous to each other; those of the two intermediate pairs form very nearly a square, the fore side being slightly the shortest. The eyes of the hind central pair are rather further from each other than each is from the lateral on its side; those of the front row are equidistant from each other, and apparently larger than those of the hinder row.

The *legs* are short, strong, tapering, and laterigrade; the difference in their relative length is very little; those of the fourth pair appeared to be slightly the longest, and those of the third pair slightly the shortest, while those of the first and second pairs were almost, if not quite, equal. The colour of the legs is pale yellow, conspicuously blotched and banded with black; they are furnished with hairs, bristles, and long slender spines; and each tarsus ends with three curved black claws.

Palpi short, similar in colour and armature to the legs, and terminating with a curved black claw.

Falces rather small, but strongish, vertical and conical; their colour is yellow-brown, banded with a darker hue towards their extremities.

The *maxillæ* and *labium* are similar in colour to the cephalothorax, as also the *sternum*, which is heart-shaped, rather convex and glossy.

Abdomen large, convex above, broad and rounded in front, pointed behind, and projects greatly over the base of the cephalothorax; the texture of the cuticle is strong; it is of a metallic silvery nature on the upperside; the sides, as also the fore and undersides, are deep brown; the underside has a central somewhat cruciform silvery patch; the upperside is charged with a large elongate-triangular deep brown marking, which does not quite touch the brown fore side, its margins are irregularly notched or dentate, and its acute point terminates just above the spinners; this marking is mottled with minute silvery dots behind, and has an inverted T-shaped metallic silvery marking on its fore part; on either side of the brown triangular marking are a few small dark brownish elongate spots. The whole of the upperside of the abdomen is thinly covered with small

reddish-brown shining tubercles; some of those on the fore side have long curved pale spine-like bristles issuing from them; and probably similar ones had been rubbed off from the rest. Spinners short, and devoid of any specially distinguishing feature.

A single female of this curious Spider was received from Mr. Thwaites in the Ceylon collection before mentioned; it appears to belong to some hitherto uncharacterized genus, and to be of the family *Thomisides*. Although not quite adult, it had the appearance of being nearly full-grown; nothing is known of its habits.

Family Myrmecides.

Nov. gen. Aphantochilus (ἀ priv. φαίνω, to appear, and χεῖλος, the lip).

Characters of the Genus.—*Cephalothorax* long, broader in front than behind, divided into quasi-segments by strong constrictions, and armed with some longish pointed corneous projections; clypeus large, somewhat quadrate, and prominent.

Abdomen short, broad, oval, united to the cephalothorax by a cylindrical pedicle.

Eyes eight, small and unequal in size, situated in two quadrangular groups of four each; the groups widely separated from each other on the highest part of the caput.

Legs moderately long and strong; relative length 4, 1, 2, 3, those of the first three pairs being very nearly, if not quite, equal in length; each tarsus ends with two curved pectinated claws.

Maxillæ long, straight, and strong, very wide at their bases, the inner edges of which are contiguous, as also are their inner edges near their extremities; these are a little enlarged and rounded on their *outer*, and obliquely truncated on their *inner* sides.

Labium obsolete.

Sternum apparently duplicate; the fore one narrow, somewhat oblong-oval, deeply emarginate or indented on the edges opposite to the legs of the first three pairs, and terminating in a point between those of the third pair; between this point and the coxæ of the legs of the fourth pair (which are in contact with each other) is a very small second or rudimentary sternal plate, round, and quite separate from the fore one.

Aphantochilus rogersii, n. sp. (Plate XLIV. fig. 10.)

Female adult, length 5 lines.

The cephalothorax is more than double as long as it is broad, and strongly constricted in two places—behind the caput, and between the third and fourth pairs of legs; the caput is a little higher than the rest of the cephalothorax, and forms a sort of elevated transverse ridge, on the extremities of the highest part of which the eyes are placed; these extremities are prolonged in a lateral direction on either side into a longish strong horn-like process pointed at its extremity, slightly curved and directed forwards; the centre of the thorax is

also elevated into a similar horn, straight, sharp-pointed, and inclining backwards; the surface of the cephalothorax is black; it reflects green and golden tints in a strong light, and is uniformly granular over the thorax; the caput is strongly and thickly punctured, and has a bright red-brown hue between the eyes; the *clypeus*, which is of remarkable size, and wider than the upper part of the caput, is about double as broad as it is long; it is rounded on the *lateral*, and hollow on the fore margin; the latter projects considerably over the base of the falces, and is armed along its edge with a row of small spines.

The *eyes* may be described either as in two widely separated groups of four each, or in two nearly concentric long curved rows, the curve directed forwards, and the hinder row the longest. The external eyes of each row are larger than the centrals, and the space between each of the centrals of either row is equal; these four eyes thus form a transverse parallelogram, whose length is more than double its breadth; the two hind central eyes are the smallest of the eight; the two laterals on either side spring (one before and the other behind) from the base of the two horns above mentioned.

Legs black, furnished with a very few small spines, fine bristles, and hairs; those of the first three pairs seemed to have little or no difference in their relative length, those of the fourth pair being considerably the longest; each femoral joint is prolonged on its upperside into a strong bluntish spur; a somewhat bent and long narrow cream-yellow stripe is conspicuous on the uppersides of the metatarsi of the first two pairs of legs, and a smaller one on those of the third pair. The tarsi as well as the fore extremity (on the underside) of the metatarsi are thickly furnished with hairs; and beneath the two terminal claws is a scopula, or brush of close-set hairs.

Palpi short, strong, and tapering; they are similar to the legs in colour; the radial and digital joints are closely united and look almost like one joint, the latter are thickly furnished on their undersides with short papillæform hairs. No terminal claw was visible; but possibly a very minute one may be concealed by the hairs with which the extremity is furnished.

Falces short, strong, conical, and nearly vertical; they are set back beneath the prominent lower margin of the clypeus; their colour is a brightish yellow, with the extremities dark red-brown; and their upper surface is furnished with spiny bristles.

The *maxillæ*, *sternum*, and connecting pedicle between the abdomen and cephalothorax are black.

The *abdomen* is short, broad-oval or roundish, and a little pointed behind, moderately convex above, somewhat rugulose, longitudinally on the sides, and transversely below; it is sparingly clothed with short hairs and a few pale bristles, and is of a dull greyish olive-green hue, broadly darker along the median line of the upperside; on either side of this, and not very far from the centre of the abdomen, is a not very conspicuous circular impressed eye-like marking of a deep brown colour. The spiracular plates form one large deep-black-brown shining coriaceous area enclosing the epigyne, the aperture of

which is of a semicircular or crescent shape. The spinners are short, strong, and compactly grouped, the four forming the superior and inferior pairs completely concealing (if they existed) the normal *third* pair.

An adult female of this most remarkable Spider was received lately from Santa Fé, Minas Geraes, Brazil, where it was captured by Mr. Henry Rogers, after whom I have great pleasure in naming it. The absence of a *labium* stamps it at once as unique among our yet recorded Araneidea.

Some systematists might consider this character of sufficient importance to warrant the foundation of a separate family; but, considering it only of generic value, I have based upon that and other strong positive characters the present new genus. The Ant-like appearance of this species has already been remarked upon (introd. *suprà*). The great development of the clypeus, with the two horns on the caput, give it a very striking appearance, much resembling the broad muzzle and head of a Bull.

An adult female of a very closely allied (if not identical) species is in the British Museum, captured at Ega, Brazil, by Mr. Bates; it is, however, smaller, and may possibly prove to be distinct.

EXPLANATION OF PLATE XLIV.

Fig. 1. *Stenochilus hobsonii*, ♂, p. 729.
- *a*. Profile of cephalothorax.
- *b*. Underside of cephalothorax.
- *c*. Fore right view of eyes and falces.
- *d*. Extremity of tarsus.
- *e*, *f*. Palpus in two positions.
- *g*. Natural length of Spider.

2. *Cydippe unguiculata*, ♂, p. 731.
- *a*. Profile of cephalothorax.
- *b*. Underside of cephalothorax.
- *c*. Fore right view of eyes and falces.
- *d*. Extremity of tarsus.
- *e*. Natural length of Spider.
- *f*, *g*. Palpus in two positions.

3. *Sphecozone rubescens*, ♂, p. 733.
- *a*. Profile of cephalothorax.
- *b*. Fore right view of eyes and falces.
- *c*. Underside of cephalothorax.
- *d*. Extremity of tarsus.
- *e*. Natural length of Spider.
- *f*, *g*. Palpus in two positions.

4. *Cephalobares globiceps*, ♂, p. 735.
- *a*. Profile of cephalothorax.
- *b*. Underside of cephalothorax.
- *c*. Fore right view of eyes and falces.
- *d*. Extremity of tarsus.
- *e*. Natural length of Spider.
- *f*, *g*. Palpus in two positions.

5. *Moneta spinigera*, ♀, p. 736.
- *a*. Profile of cephalothorax.
- *b*. Underside of cephalothorax.
- *c*. Fore right view of eyes and falces.
- *d*. Natural length of Spider.

Fig. 6. *Chorizopes frontalis*, ♀, p. 738.
a. Profile of cephalothorax.
b. Underside of cephalothorax.
c. Fore right view of eyes and falces.
d. Extremity of tarsus.
e. Natural length of Spider.
7. *Œta spinosa*, ♂, p. 739.
a. Profile of cephalothorax.
b. Underside of cephalothorax.
c. Fore right view of eyes and falces.
d, *e*. Palpus in two positions.
f. Natural length of Spider.
8. *Rhion pallidum*, ♂, p. 741.
a. Profile of cephalothorax.
b. Fore right view of eyes and falces.
c. Underside of cephalothorax.
d. Extremity of tarsus.
e. Natural length of Spider.
f, *g*. Palpus in two positions.
9. *Phycus brevis*, ♀, p. 743.
a. Profile of cephalothorax.
b. Fore right view of eyes and falces.
c. Underside of cephalothorax.
d. Extremity of tarsus of first and second pairs of legs.
e. Natural length of Spider.
10. *Aphantochilus rogersii*, ♀, p. 744.
a. Profile of cephalothorax.
b. Underside of cephalothorax.
c. Fore part of cephalothorax (upperside viewed from behind).
d. Portion of leg.
e. Natural length of Spider.

November 15, 1870.

Professor Flower, F.R.S., V.P., in the Chair.

Mr. Sclater exhibited a specimen of the new Australian Mud-fish, recently described in the Society's 'Proceedings' (1870, p. 222) by Mr. Gerard Krefft, C.M.Z.S., under the name of *Ceratodus forsteri*. For this valuable specimen Mr. Sclater was indebted to the kindness of Mr. E. P. Ramsay, of Dobroyde, N. S. W. The fish had been procured by Mr. Ramsay's agent in Queensland from a branch of the Mary River, on Eootaley Station, having been captured by hook and line by some blacks in the employ of Mr. D. Helsham. In letters to Mr. Sclater, Mr. Ramsay stated that he had made arrangements to have a large water-hole in the same neighbourhood dragged, and was therefore expecting a further supply of specimens, which he hoped to be able to forward, along with some remarks upon the habits of this fish, at an early opportunity.

Dr. J. Murie read a memoir on the form and structure of the

Manatee (*Manatus americanus*), as deduced from a fresh specimen of this animal forwarded to this Society in a living state by Mr. G. W. Latimer, of Porto Rico, C.M.Z.S., in April 1866, but which had unfortunately died just before reaching Southampton.

This paper will be published in full in the Society's 'Transactions.'

The following (eighth) letter on the Ornithology of Buenos Ayres, addressed to the Secretary by Mr. W. H. Hudson, C.M.Z.S., was read:—

Buenos Ayres, May 19, 1870.

Dear Sir,—While you are just beginning to experience and observe the reviving influences of spring, the bitter weather of the last few days "feelingly persuades" us that the cold season has come to Buenos Ayres. We have already had enough of rain, wind, frost, and cloudy days to make this May one of unusual gloom. The wild and melancholy notes of Winter Snipes and Plovers, that are always most numerous in severe seasons, are constantly heard, while of the summer visitors not a solitary straggler is to be seen, and the trees, that according to some theorists have no business to be growing on the Pampas, are fast losing their few remaining leaves.

It is interesting to observe the effect of the cold weather on some of our resident birds—for example, the Urraca (*Cyanocorax pileatus*), to which probably the first Spanish settlers gave this name from a fancy that it resembles the Magpie of Europe. The long tail of the Urraca, so awkward in windy weather, its slow laborious flight, scanty plumage, and climbing feet, in all things so different from the true Pampas birds, prove it to have been adapted to a hot climate in a country abounding in forests. It is, I believe, common in South Brazil, Paraguay, and the Chaco. The manner in which many species inhabiting these regions reach and become natives of this country I have tried to explain in former letters. The *Urraca* and birds like it with short wings, that obtain their food in woody districts, could only have extended so far into a country ill adapted to them by gradually advancing along the unbroken line of woods that border the Plata and its tributaries. In this littoral forest the *Urraca* is most numerous, becoming rarer the further we advance west from it; but though it feeds much on the ground, it is never seen far from the vicinity of trees, except, as happens with the Pampas Woodpecker (*Colaptes campestris*), when passing from one isolated wood or plantation to another.

The *Urraca* is in winter a miserable bird, and appears to suffer more than any other creature from cold. In the evening the flock, usually composed of from ten to twenty individuals, gathers on a thick branch of a tree sheltered from the wind, the birds crowding close together for warmth, and some of them roosting perched on the backs of their fellows. I once saw six birds roosting in this manner—two of them resting on the tree, perched on the branch, and one on their backs, so that they formed a perfect pyramid. But

with all this a heavy frost is sure to prove fatal to one or more birds in the flock, and sometimes several individuals that have dropped from the branches stiff with cold may be found under the trees where they have roosted. In the morning, if fair, the flock betakes itself to some large tree on which the sun shines, and settle on the outermost twigs on its eastern side, each bird with its wings drooping and its back turned towards the sun. In this attitude, so spiritless, but denoting such great sagacity, they spend an hour or two warming their blood and drying the dew from their scanty dress. During the day they bask much in the sun, and towards night may be again seen on the sunny side of a hedge or tree warming their backs in the last rays. It is owing, I think, to its fecundity and to an abundance of food that the Urraca is able to maintain its place in our fauna; otherwise the cold, its only enemy, would surely prove fatal to it.

With the return of warm weather it becomes active, noisy, and the gayest of birds; the flock constantly wanders about from place to place, the birds flying in a scattered desultory manner one behind the other, and incessantly uttering, while on the wing, a querulous, complaining cry. At intervals through the day they utter a species of song, composed of a number of long modulated whistling notes, the first powerful and vehement, and becoming at each repetition lower and shorter, then suddenly ending in a succession of hoarse internal notes resembling the heavy breathing or snoring of a man asleep. When approached, the whole flock breaks out into a chorus of alarm, with notes so annoyingly loud, shrill, and sustained, that the intruder, be it man or beast, is generally glad to quit their vicinity. As the breeding-season approaches, they are heard, probably the males, to utter a variety of low and soft chattering notes; they then separate in pairs and grow more silent, becoming also very circumspect in their movements. The nest is usually built in a large thorn tree, and is composed of rather stout sticks; these are sometimes so rudely put together that the eggs fall from it. Other nests are found more ingeniously constructed, deep, and lined with fibres of weeds, dry or green leaves. The nest usually contains six or seven eggs, but often more; and I have once found one with fourteen. It seems incredible that one bird should have laid all these eggs, the eggs being so very large in proportion to the bird's size; yet there was but one pair of Urracas in the neighbourhood of this nest, for I had watched them from the moment they began to build. The eggs, when fresh, are very beautiful, being of a rich sky-blue, thickly spotted with white. The white spots are composed of a soft calcareous substance, apparently deposited on the surface of the shell after its complete formation. When the egg is newly laid, they may be easily washed off with water, and are so extremely delicate that their purity is lost on the egg being taken into the hand. The young birds hatched from these lovely eggs are proverbial for their ugliness, *Pichon de Urraca* being an epithet commonly applied here to a person remarkable for want of comeliness. They are as filthy as they are ugly, so that the nest, generally containing six or eight young,

is pleasant neither to sight nor smell. But there is something extremely ludicrous in the notes of these young birds, resembling, as they do, the shrill half hysterical laughter of a female exhausted by over indulgence in mirth.

A few summers ago there was a brood of young Urracas in a tree close to my house. Every time we heard the parent bird hurrying to her young with food in her beak we used to run to the door to hear them. As soon as the old bird reached the nest they would burst forth into such wild extravagant peals, and continue them so long, that we could not but think it a rich amusement to listen to them. When taken young, Urracas become very tame and make bold, noisy, mischievous pets, fond of climbing over and tugging at the clothes, buttons, and hair of their master or mistress. Though somewhat fierce-looking, the *Urraca* is the most peaceable of birds, never quarrelling with his fellows. Their food, like that of the Cuckoos, consists principally of large insects; they also prey on mice and small reptiles, and in winter and spring may be seen following the plough to pick up worms in company with the Blackbirds, Gulls, and other species widely differing in their natures.

I am, yours &c.,

WILLIAM H. HUDSON.

The following papers were read:—

1. Additional Notes on the Introduction of *Salmonidæ* into Tasmania. By MORTON ALLPORT, F.Z.S., F.L.S.

Dr. Günther has written informing me that the Salmonoid sent to England at the end of last year, and referred to in my former paper*, was an example of Sea-trout (*Salmo trutta*). This determination of the species would have sufficiently proved the success of the experiment as to one of the migratory Salmonidæ, had not Dr. Günther added the following remarks:—"I am informed that a lot of Sea-trout eggs were forwarded to Tasmania several years ago and hatched in May 1866. If you never on any other occasion received eggs of *Salmo trutta*, it would follow that this example is three and a half years old, and consequently a what may be called stunted individual, as a fish of that age ought to have attained to a larger size, and to exhibit a certain development of the sexual organs, of which no trace could be discovered in the individual sent. As it often, almost always, happens that individuals from the same lot of eggs are very unequally developed, the condition of this individual does not prove that its brethren are in an equally undeveloped state; others may have attained to the normal size and weight."

Having carefully watched the progress of the fish in Tasmania, I am unable to reconcile this assumption, that the specimen sent to England must necessarily be 3½ years old, with the facts.

The Tasmanian Salmon Commissioners received but one shipment

* P. Z. S. 1870, p. 14.

of the ova of *Salmo trutta*, which arrived in April 1866. These ova were kept in a separate hatching-box, and hatched in May following. Part of the fry were placed in the same pond with the Salmon-fry hatched that year; the residue were placed in a separate pond and rill constructed for them. In October 1867, more than half of the fry in the Salmon-pond assumed the smolt dress and went to sea, the gratings being purposely removed. In October 1868, all that were left of the fry in the Salmon-pond put on the smolt scales and left for sea.

Of the fry placed in the other pond, a number assumed the smolt dress in October 1867, but were purposely kept back, in the hope that spawn might be obtained without the usual migration seawards. The smolts became very restless; several threw themselves on to the banks and were destroyed; others died, and amongst them one which I preserved and have forwarded by this mail for preservation to the Society.

In October 1868, all the fishes that were left in the separate pond, and which had not become smolts the year before, put on the bright scales and exhibited the usual restlessness. Again several died, and before the commencement of winter, in May 1869, the Commissioners lowered the water to make certain alterations in the pond, and found the fishes reduced in number to twelve, all of which were handsome silvery fishes, without the slighest trace of parr markings, and varying in weight from nearly half a pound to more than a pound. During June and July 1869, five spawing rids were constructed by these fishes in the rill attached to their pond. The old fishes were then shut off from the rill by a fine wire grating, to prevent their interfering with the ova, which commenced hatching in September. In December 1869, 500 of the fry from these ova were set at liberty in the River Huron, the remainder being retained to increase the breeding stock, and to ascertain whether the migratory instinct would recur in these fish.

The fry so retained are now, at eight months old, the picture of health, and exhibit the brilliant orange fin from which the trivial English name of the parr of *Salmo trutta* is derived. One of these parr I have also forwarded for preservation to the Society.

From the foregoing details it is manifest that, if the specimen sent to England was hatched from ova received in April 1866, that fish must have left our pond as a smolt in October 1868, and remained a year, either in the river or in the sea, without adding one inch to its length, or one ounce to its weight, while its brethren, unnaturally detained in fresh water, not only increased in size, but arrived at sexual maturity and deposited healthy ova.

From Dr. Günther's letter it is clear that, if he had received the fish sent from a Scotch instead of a Tasmanian river, he would have pronounced it a healthy fish, as it might then have been a smolt of either 15 months or 27 months old without presenting any abnormal conditions; and is it not quite possible that a few pairs of the smolts which went to sea in October 1867 may have returned to the river (as many British authorities hold they do) in the February following as breeding fish, which would deposit ova in June or July

1868, which ova would, in October 1869, have furnished fishes in the very condition of the specimen sent?

The circumstances of the capture of the two smolts strongly confirm this last view; for since the commencement of the experiment, the sea-beaches on which they were caught have been persistently fished with seine nets and rewards have been offered to the fishermen for any unknown fishes captured; yet out of about 4000 Salmon-smolts which went to sea during 1864 and 1865, and about 6000 which went during 1867 and 1868, not a single specimen was caught, while (if the fish sent was 3½ years old) out of about 200 Salmon-trout smolts liberated in 1867 and 1868, two have been taken; for the second specimen, though larger than that sent, and caught in a separate locality, is identical in species and condition, and therefore equally abortive. It is, moreover, difficult to believe that abortive fishes would voluntarily travel more than 30 miles in obedience to an instinct given them to perfect those very organs which in their case are absent. Unless the Salmon-trout have bred in Tasmanian waters, the doctrine of chance has been strangely overridden in this case.

It may be urged that, as none of the fishes retained in the breeding-pond spawned in the winter of 1868, it is unlikely that any of those liberated did so; but may not the unnatural detention in fresh water have retarded the development of the fishes in the pond? A great majority of the Common Trout (*Salmo fario*) hatched in September 1866, spawned in June and July 1868; and some of those Salmon-trout which went to sea may well have attained sexual maturity in the same period.

About six weeks after the capture of the two smolts before referred to, a much larger specimen was caught on one of the same sea-beaches. This fish is exactly what would be called in many English rivers a Sprod; and, after carefully comparing it with the written descriptions of Yarrell and Dr. Günther, I can only conclude it is a true *Salmo salar*. This last specimen I have also forwarded for presentation to the Society, in the hope that some competent authority may examine and report upon it*.

2. On the Anatomy of *Ælurus fulgens*, Fr. Cuv.

By William Henry Flower, F.R.S., V.P.Z.S., &c.

The animal which forms the subject of the present communication was first brought under the notice of zoologists by General Hardwicke, in a paper read before the Linnean Society, Nov. 6, 1821, entitled "Description of a new Genus of the Class Mammalia, from the Himalaya chain of Hills between Nepaul and the Snowy Mountains." The publication of this paper was unfortunately delayed for

* Dr. Günther has examined this specimen, and has found that it presents the usual characters by which *Salmo salar* is distinguishable from its nearest allies.—Ed.

about six years *, when the name by which the author had characterized the animal was withdrawn in favour of AILURUS†, bestowed upon it by Fr. Cuvier, who in the meantime had received a specimen from M. Duvaucel, and given a coloured figure of the entire animal, and a full description of its external characters, in the fiftieth number of the 'Histoire Naturelle des Mammifères' (vol. iii.), June 1825. M. Cuvier uses the word "Panda" as the trivial name, and proposes the generic term *Ailurus* "à cause de sa ressemblance extérieure avec le Chat." This was not a very happy choice, as in all structural characters indicative of true affinity it is almost as widely removed from the true Cats as any member of the group of terrestrial Carnivora.

With the skin sent to the Paris Museum by M. Duvaucel were the jaw-bones and teeth, wanting the posterior molars, and also the bones of the feet. These are the only fragments of the osteology of *Ælurus* figured or described in De Blainville's 'Ostéographie.'

For further information upon the habits and structure of the "Panda," or "Wáh," as it was now called, we are indebted to a paper by Mr. Bryan H. Hodgson in 'Journ. Asiat. Soc. Bengal,' vol. xvi. p. 1113 (1847). Unfortunately, at the time of writing this notice, Mr. Hodgson's original manuscript, containing, as he says, "a full and careful description of the habits and of the hard and soft anatomy of *Ailurus*," had been lost, and consequently the anatomical description, as published, is exceedingly meagre and unsatisfactory. It constitutes, however, the whole of the information possessed at at present upon the subject. The paper is illustrated by slight sketches of the external appearance of the animal in several attitudes, and of the base of the skull and the mandible, with much-worn teeth.

Woodcuts of the side view of the skull and palate are given in Dr. Gray's "Revision of the Ursidæ" (P. Z. S. 1864, p. 708). Although of no use for details of structure, they serve to show the general outline of the cranium and the peculiar form of the mandible.

On the 22nd of May 1869, a living specimen of *Ælurus* (the first which had reached Europe) arrived at the Society's Gardens, having been presented by Dr. H. Simpson. It was captured in the neighbourhood of Darjeeling. Notices relating to this specimen will be found in P. Z. S. 1869, p. 278, *ibid.* p. 408, with a woodcut-illustration from life, *ibid.* p. 507. Pl. XLI. of the same volume contains a coloured lithograph of the animal drawn from life ‡.

* Trans. Linn. Soc. vol. xv. 1827. Tab. ii. contains figures of the feet and teeth. It is scarcely necessary to remark that the truncation of the cusps of the molar teeth, attributed by Hardwicke to original structure, and as such carefully described among the generic characters, is certainly due to attrition from use. In the present example, as well as in that figured by De Blainville, the apices of these cusps are perfect.

† Modified by Van der Hoeven (Handbuch der Zoologie) into *Ælurus*.

‡ Mr. Hodgson remarks that he never observed the specimens of Æluri kept alive by him "employ the hands, as the Racoons and Coatis and Bears do, to facilitate the process of eating." Bearing this remark in mind, it may be noticed with surprise that, in the figure alluded to above, the animal is represented as holding a bunch of fruit in its fore paw; but this was a circumstance so constantly noted during its residence in the Zoological Gardens, that it was thought worth while to commemorate the habit in the portrait. (See Mr. Bartlett's "Remarks on the Habits of the Panda in Captivity," P. Z. S. 1870, p. 769.)

On its arrival it was in an extremely feeble and emaciated condition, though, under the careful treatment of the Superintendent of the Gardens, it gradually recovered health and strength; but, while apparently in excellent condition, it died suddenly in the night of December 12, and was sent to the Royal College of Surgeons on the following morning.

Unfortunately my other engagements were then so numerous that I was not able to undertake as complete an examination of the anatomy of this interesting animal as I could have wished, and I have not since had time or opportunity to make such a detailed comparison of its structure with that of allied forms as may be desirable. As, however, the opportunity of dissecting an *Ælurus* may not occur again for some time, I think it right not to withhold any longer from the Society such notes as I have made, especially as they relate to most of the essential points required to determine the affinities and position of the genus.

The animal was a male, and of full size, though incomplete union of the epiphyses of some of the larger limb-bones, and the unworn condition of the teeth (of which the permanent set were all in place), showed that it had but just attained to adult age.

It was in exceedingly good condition—the subcutaneous tissue and the mesentery and subperitoneal tissue being loaded with fat. The only morbid appearances observed throughout the dissection were certain hæmorrhagic spots, presently to be described, in the intestinal canal; but after the preparation of the skeleton it became evident that the bones generally were soft and spongy in texture, a condition not unusual in animals which die under the abnormal or unhealthy circumstances to which they are subjected in captivity.

The weight of the animal was 9½ lbs. It measured from the end of the nose to the root of the tail 24″; the tail was 17″ long without the hair, or, to the end of the hairy tip, 19½″. These dimensions, as well as the weight, slightly exceed those given by Hodgson for a mature male animal.

The external characters of *Ælurus* are too well known to need further description; but some details regarding the structure of the limbs may be noted. Amid the dense woolly covering of the under surface of the feet, the merest rudiments of naked pads can be detected by separating the hairs under the prominences formed by the articulation between the second and third phalanges of each digit; and there is a larger, transversely oval, bare space ·4″ across, covered by pink, soft skin, and scarcely forming any prominence, in the place of the usual palmar or plantar pad.

The claws are of nearly equal size, and semiretractile on both fore and hind feet. When allowed to take their natural position, the middle phalanx is bent down nearly at a right angle with the proximal phalanx, but the terminal phalanx projects forwards, so that the end of the claw is always exposed, extending distinctly beyond the dense hairy clothing of the foot. There is a strong elastic ligament to maintain this position. The claws are very sharp, moderately curved and much compressed, ·75″ long, measured in a straight line from base to tip, and ·35″ deep at the base.

The feet are very broad, and evenly rounded in front. The following table * shows the relative length of the five digits of each foot, measured from a common base-line, the hinder edge of the palm or sole, as the case might be, to the tip of each claw :—

	Manus.	Pes.
1st digit.....	2·1″	3·5″
2nd „	2·9	4·3
3rd „	3·3	4·6
4th „	3·1	4·4
5th „	2·7	4·1

The Brain.

The general form of the brain, and the arrangement of the sulci and gyri of the hemispheres, are shown in figs. 1, 2, and 3. The length of each cerebral hemisphere was 2·2″, and the greatest width of the entire brain near the posterior part of the hemispheres 1·8″. The cerebral capacity, taken from a cast of the interior of the skull, was 3 cubic inches.

Both the form of the hemispheres and the disposition of the gyri upon their surface are eminently characteristic of the arctoid group of the Carnivora, as pointed out in P. Z. S. 1869, p. 482. They resemble very closely those of *Procyon*. It should be remarked that there is a noticeable want of exact bilateral symmetry.

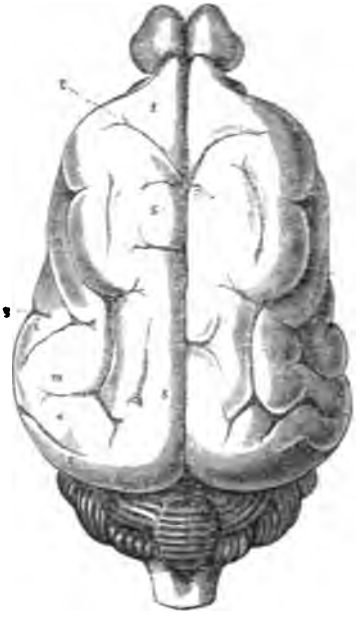
The sylvian fissure (*S*) is situated rather behind the middle of the side of the hemisphere, and inclines upwards and backwards, being nearly ·6″ long. The internal gyrus (*i i*), which immediately surrounds it, has the anterior limb much narrower than the posterior; the angle at which the gyrus is folded on itself above is very acute; the lower part of the posterior limb is broad, and indented by a short sulcus descending from the middle of the sylvian fissure, and which is not found, or is only slightly indicated, in *Ursus*, *Procyon*, and *Nasua*.

The middle gyrus (*m m*) is of nearly uniform thickness throughout, is marked by a few secondary sulci, and surrounds the internal gyrus in the whole of its extent.

The superior gyrus (*s s*) is large and complex. Commencing in the supraorbital region, close to the root of the olfactory lobe, it passes forwards and inwards, and winds round the supraorbital sulcus (*O*); then it bends outwards round the strongly marked crucial sulcus (*C*), behind which it is very broad, and almost divided into two by a well-marked longitudinal sulcus. In the middle of the hemisphere, above the apex of the sylvian fissure, it is narrower and straight. Posteriorly it winds round the middle gyrus, and forms the hinder margin of the hemisphere, being distinctly divided from the middle gyrus almost as far as the lower border of the temporal lobe. On the left side, however, there is a bridging convolution (*) between these two gyri, wanting on the right.

* From notes kindly taken for me by my friend Mr. John C. Galton, M.A.

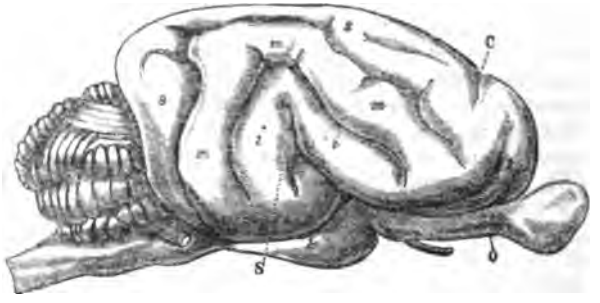
Fig. 1.



Upper surface of the brain; natural size.

C. Crucial sulcus. *S.* Sylvian fissure. *s.* Superior external gyrus. *m.* Middle external gyrus. *i.* Inferior external gyrus. The cerebellum is rather more exposed in these figures than when the brain was *in situ*.

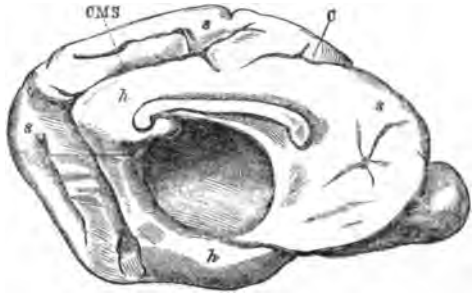
Fig. 2.



Side view of the brain; natural size.

S. Sylvian fissure. *C.* Crucial sulcus. *O.* Supraorbital sulcus. *s.* Superior external gyrus. *m.* Middle external gyrus. *i.* Inferior external gyrus. *h.* Hippocampal gyrus.

Fig. 3.



Inner surface of left cerebral hemisphere; natural size.

C M S. Calloso-marginal sulcus. *C.* Crucial sulcus. *s.* Superior external gyrus. *h.* Hippocampal gyrus.

On the inner side of the hemisphere, the crucial sulcus (*C*) is strongly marked, running obliquely backwards. The horizontal portion of the calloso-marginal sulcus (*C M S*) is short, not extending further forward than over the middle of the corpus callosum; so that, anteriorly to this spot, the internal or hippocampal gyrus (*h*) is not distinguishable from the superior (*s*). Posteriorly the sulcus bends downwards and forwards at a sharp angle, separating the hippocampal gyrus in front from a broad descending portion of the superior gyrus (*s*) behind. The latter is divided by a strongly marked sulcus, lying parallel with the descending portion of the calloso-marginal sulcus, into two parallel portions of nearly equal breadth.

The corpus callosum is ·9″ in length.

The cerebellum is 1·3″ broad, and projects by nearly half its antero-posterior length behind the posterior margin of the cerebral hemispheres. It appeared to present no notable difference in form from that of other allied species.

Mouth, Tongue, and Larynx.

The mucous membrane lining the buccal cavity is smooth, and of a pale pink colour, but black at the edges, especially upon the inside of the upper lip. The gums surrounding the incisors, especially the upper series, are mottled with black.

The palate is of very peculiar form; it is concave immediately behind the incisor teeth, then becomes convex between the posterior premolars, and is hollowed again between the true molars. The ridges are not very prominent or regular; those placed most anteriorly form a wide curve with the concavity backwards, extending completely across the palate, though slightly broken in the middle line; they gradually slope more and more backwards at their outer ends. Behind the seventh there are two or three not quite symme-

trical, and not passing across the middle line. Beyond the posterior molar teeth the palate is quite smooth, and the cavity of the mouth becomes narrow and tubular, the soft palate terminating by a thin straight edge, without uvula, rather more than an inch behind the end of the middle line of the hard palate.

On each side of the fauces, opposite the root of the tongue, the tonsils appear as very distinct, longitudinally disposed, saccular depressions, ¼ inch in length, the inferior margins of which are everted, hard, and tumid, and form conspicuous elongated fusiform elevations.

The tongue appears to have no special extensibility. It is rather thick and fleshy in its posterior half. Its dorsal surface is flat anteriorly. From the base it slightly widens forwards to the middle, then gradually narrows towards the apex, which is somewhat abruptly truncated. It is 3″ long from base to tip, 1·1″ in greatest breadth, ·5″ wide close to the tip; the apex projects ·8″ beyond the frænum.

The papillæ are small and soft, consisting of numerous small, rounded "conical" papillæ (which are longer and more pointed at the base and edges than elsewhere), scattered "fungiform" papillæ—and an irregular V-shaped group of "circumvallate" papillæ, of which there are seven on the left and but four on the right side; two of the latter, however, are of double the size of any of the others, and oval in shape.

At the base of the frænum is a small flattened, bilobed sublingual process, ·2″ in width.

The lower border of the parotid gland is nearly straight, 2″ from before backwards; above, the gland is divided into two portions, one rising in front of, the other behind, the meatus auditorius; the latter is twice the size of the former. The duct leaves the anterior inferior angle of the gland, and runs directly forwards across the masseter muscle, and enters the mouth opposite the hinder edge of the third premolar. The submaxillary gland is small and oval, broader behind than in front, somewhat compressed, 1″ in length, ·5″ in greatest thickness, with a small accessory gland composed of very loosely connected lobules lying at the upper anterior border, and which has a distinct duct which joins the main duct of the submaxillary half an inch from the principal gland. The conjoined duct, 2 inches in length, terminates in an orifice at the under surface of the sublingual process.

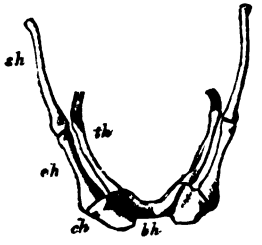
The epiglottis is in the form of an equilateral triangle, each side of which is ½″ long. The apex is scarcely at all rounded. Both upper and lower vocal cords are very distinct, with a well-marked ventricle between them. The upper or false cords are very thin, but prominent, ridges; the lower or true vocal cords are flattened bands, with the upper edge the most distinct. The thyroid cartilage is very narrow from above downwards, measuring but ·15″ in the middle of each ala. Anteriorly it has a deep median notch in the inferior border. Near the external end of the same border is a well-marked triangular eminence, projecting forwards and outwards, to

which the sterno-thyroideus muscle is attached. The posterior border is convex, and elongated to the length of half an inch from above downwards by the development of the superior and inferior cornua. The cricoid cartilage is continuous across the middle line in front, but very narrow (not more than ·1″) from above downwards; posteriorly it widens to ·4″; it is convex externally at the sides, the upper and lower margins being much everted.

The thyroid bodies are each of a flattened, irregular oval form, lying on the sides of the trachea, extending from the lower edge of the cricoid cartilage to the sixth tracheal ring, and connected together below by a long and narrow band, which passes across the front of that ring. The greatest length of each of these bodies is ·7″, the greatest width ·5″; and the band which connects them is ·5″ in length.

The hyoid bones (fig. 4) consist of a basihyal (*bh*), forming a broad arch, deeply emarginate behind, ·4″ wide from side to side. The anterior cornu has three bones in close contact. The stylo-hyals (*sh*) are slender, ·6″ long, and very slightly curved. The epihyals (*eh*) are shorter and broader, especially at the lower ends, where they

Fig. 4.



Anterior view of hyoid bones; natural size.

sh. Stylo-hyal. *eh*. Epihyal. *ch*. Cerato-hyal. *bh*. Basihyal. *th*. Thyro-hyal.

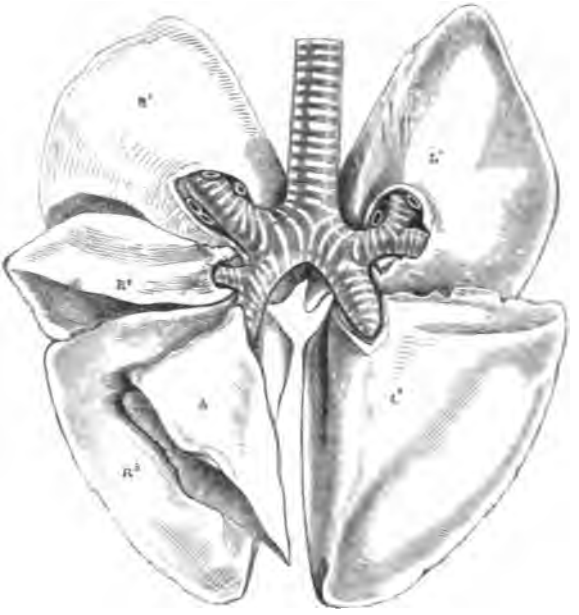
are expanded and flattened; they are ·4″ long. The cerato-hyals (*ch*) are nearly as broad as long, with a strong crest on the anterior superior border. The thyro-hyals (*th*) are compressed, broad at their basal and narrow at their thyroidal extremity, slightly curved upwards, and ·45″ in length.

Thoracic Viscera.

The trachæa is 4½″ in length, and ⅛″ in average width. It has thirty-eight cartilaginous rings. The musculo-membranous space behind the rings is ·2″ wide. It divides into two short bronchi, each of which divides again into an upper and lower branch as it enters the root of the lung to which it is destined; the left bronchus is slightly longer, and not so capacious as the right.

The left lung (fig. 5) consists of two triangular lobes (L^1 and L^2), separated almost completely by a horizontal fissure. One of the main divisions of the bronchus enters into each. The upper lobe is slightly smaller than the lower one.

Fig. 5.



Anterior surface of the lungs; two-thirds the natural size.

R^1. Right upper lobe. R^2. Right middle lobe. R^3. Right lower lobe.
A. Azygous lobe. L^1. Left upper lobe. L^2. Left lower lobe.

The right lung has an upper (R^1) and lower lobe (R^3) corresponding closely in size and form with those of the left lung; and, in addition, a small middle lobe (R^2) between the two, and a pointed "azygous" lobe (A) lying in front of the inner edge of the lower lobe. The two latter receive bronchial branches from the lower main division of the right bronchus, the upper division being confined in its distribution to the upper lobe of the lung. All four lobes are slightly connected together by lung-tissue at their base.

The thymus is very conspicuous. It is an oblong compressed, or rather trihedral, body, with one edge turned forwards and to the right and one surface backwards, and of a pale flesh-colour. Its length is 1·5″, its greatest thickness ·5″. It lies in front of the upper part of the heart and great vessels—its lower end, which is rounded and rather larger than the upper, lying over the anterior surface of the right ventricle, and the upper end in front of the first

ascending branch of the aorta, reaching as far as the origin of the right subclavian.

The pericardium is loaded with fat. The heart is rather a narrow cone in form, with a rounded apex. Its length is 2″; its greatest thickness from side to side 1·5″, from before backwards 1·3″.

The aorta gives off two main branches. The first, or innominate, ascends for 1·1″, when it gives off the right subclavian; after a further course of ·3″ it bifurcates into the two carotids. The left subclavian is given off from the aorta ·1″ beyond the innominate.

The red blood-corpuscles were measured by Mr. Gulliver, who ascertained that their average diameter was $\frac{1}{3764}$ of an inch, thus nearly corresponding with those of *Procyon*, *Nasua*, and *Meles**.

Abdominal Viscera.

On opening the abdominal cavity, no portion of the liver was visible below the margins of the ribs. The stomach was highly distended with gas; its lower border was 6 inches below the inferior extemity of the sternum. The omentum extended to halfway between the lower border of the stomach and the pubis, and was loaded with fat, disposed in ribbon-like flakes, filling up the sulci between the intestinal convolutions. The tongue-shaped extremity of the bright-red spleen was seen applied to the lower part of the left side of the stomach. The nearly empty bladder, with the urachus, could be seen at the lower extremity of the abdominal cavity; the space between this viscus and the lower border of the stomach was occupied by the intestinal convolutions. The subperitoneal fat was very abundant, especially at the posterior portion of the abdominal cavity in the lumbar region below the kidneys.

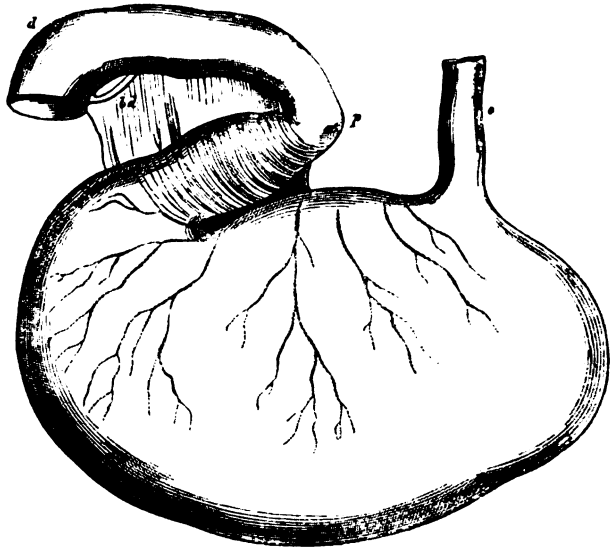
The stomach (fig. 6), when moderately distended was in the form of a short oval, with the greatest diameter about the middle. The fundus was not very large, the œsophagus entering near the cardiac extremity. The pyloric portion was narrow and tubular, marked by a slight constriction from the main part of the viscus, and sharply bent upwards and to the left, being held by a peritoneal fold close to the upper border (or lesser curvature) of the main part of the stomach. The pylorus is thus brought very near to the œsophagus, and turned directly upwards. The walls of the stomach were thin, except at the pyloric end, where the circular muscular fibres were strongly developed.

The duodenum, at its commencement, was $\frac{1}{2}$ inch in diameter, but rapidly widened to 1 inch. The entire length of the intestinal canal from pylorus to anus was 8 feet 8 inches. There was no cæcum or any perceptible distinction externally between ileum and colon, as the calibre of the tube gradually diminished from the end of the duodenum to the commencement of the rectum, where it was again slightly enlarged. The descending colon passed almost straight to the rectum, inclining slightly from the left to the mesial line of

* See P. Z. S. 1870, p. 94.

the body. Numerous hæmorrhagic blotches on the mucous membrane of the upper portion of the intestine were the only pathological changes observed in any of the viscera of the animal. Some blood had been extravasated into the intestinal canal. The villi of the upper part of the small intestine are long, delicate, and close-set. In the middle part of the canal they are smaller and less numerous, the lining membrane being quite smooth at many places; but towards the

Fig. 6.



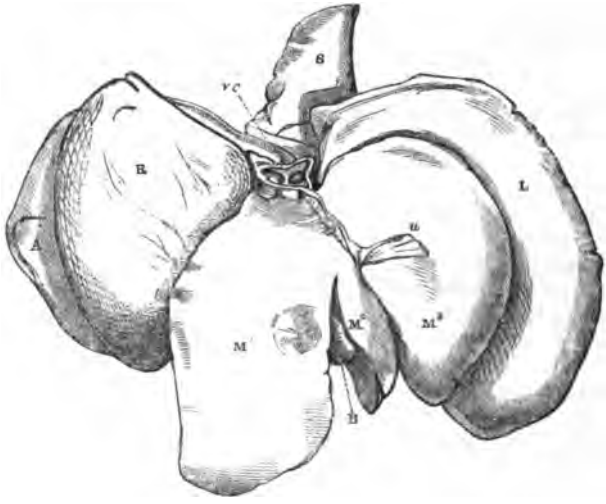
Anterior view of the stomach; half the natural size.
o. Œsophagus. *p.* Pylorus. *d.* Duodenum. *bd.* Biliary duct.

lower end they become very abundant, though comparatively short and thick. They entirely and suddenly cease 9 inches above the anus; and thenceforth the mucous membrane is smooth, though thrown into longitudinal rugæ. There are only three distinct Peyer's patches, all nearly circular: the first, ¼ inch in diameter, is 18 inches below the pylorus, the second, about twice the size, 39 inches from the pylorus, and the third as small as the first, 13 inches lower.

The liver (figs. 7 & 8) consists of three main divisions:—1. The left lobe (*L*) is simple, flattened, with a thin free border, notched in several places, and a rounded outline; on its inferior surface, close to the transverse fissure, is a small tongue-shaped accessory lobule (*a*), of which there was no trace in *Proteles* (P. Z. S. 1869, p. 489)*, and above this a deep straight horizontal fissure an inch in length. 2. The middle or cystic lobe, the lateral margins of which overlap both left and

* This lobule is slightly indicated in *Nasua*.

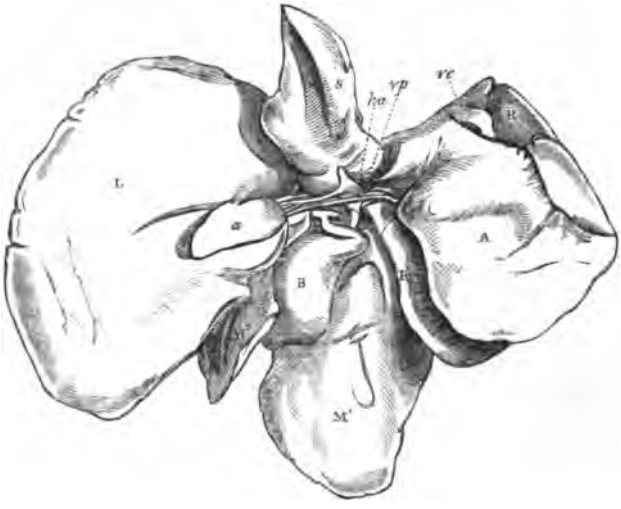
Fig. 7.



Upper surface of liver; half the natural size.

R. Right lobe. *A.* Accessory right (or caudate) lobe. M^1, M^2, and M^3. Divisions of the middle lobe. *L.* Left lobe. *S.* Spigelian lobe. *B.* Gall-bladder. *vc.* Vena cava inferior. *u.* Round ligament, or remains of umbilical vein.

Fig. 8.



Under surface of liver; half the natural size.

L. Left lobe. *a.* Accessory left lobe. M^1, M^2. Divisions of middle lobe (M^3 is concealed by *L*). *R.* Right lobe. *A.* Accessory right (or caudate) lobe. *B.* Gall-bladder. *S.* Spigelian lobe. *ha.* Hepatic artery. *vp.* Vena portæ. *vc.* Vena cava.

right lobes, is deeply divided by the fissure, through which the round ligament (*u*) passes, into a left and right portion; the former (M^2) is subtriangular, with a pointed free extremity, and not further subdivided; the latter (M^1) is rather the larger of the two, and, very near its left border, has a deep cleft in which the gall-bladder (*B*) is situated, the fundus being visible on the upper surface of the liver in this cleft. There is thus a distinct, narrow, tongue-shaped lobule (M^4) between the umbilical and the cystic fissures *. 3. The right lobe (*R*) is rather smaller, though thicker, than the left, and of a subquadrate form. It has the usual two accessory lobules on its under surface—the pyramidal pointed Spigelian lobule (*S*), and a remarkably large caudate lobule (*A*), grooved above for the inferior vena cava, and projecting beyond the right lateral margin of the main superior division of the lobe †.

The inferior vena cava (*vc*) perforates the upper or posterior border of the right lobe, running for a distance of an inch and a half under a bridge of the hepatic substance, at its emergence from which it is joined by the hepatic veins.

The gall-bladder is of the usual pyriform shape. The commencement of the duct is sharply bent upon the neck of the bladder, and it makes another sharp bend in the contrary direction at the junction of the hepatic ducts. Its fundus (*B*) appears on the upper surface of the liver in the cleft between the divisions of the lobe marked M^1 and M^2 in the figure. It also displaces the substance of M^1 a short distance to the right of the fissure, and appears on the surface only covered by the external capsule of the liver.

The spleen is elongated and perfectly simple, without any notch or fissure, rather broader at the lower than at the upper end. Its length is 5·7″, and its greatest breadth 1″.

The right kidney is placed very slightly higher than the left. These organs are perfectly simple, having no indications of division into lobuli on their surface. The length of each is 1·9″, its greatest breadth 1·1″.

The suprarenal bodies are placed close to the upper end of each kidney; they are small, oval, and somewhat flattened, ·35″ in greatest length.

Pelvic Viscera.

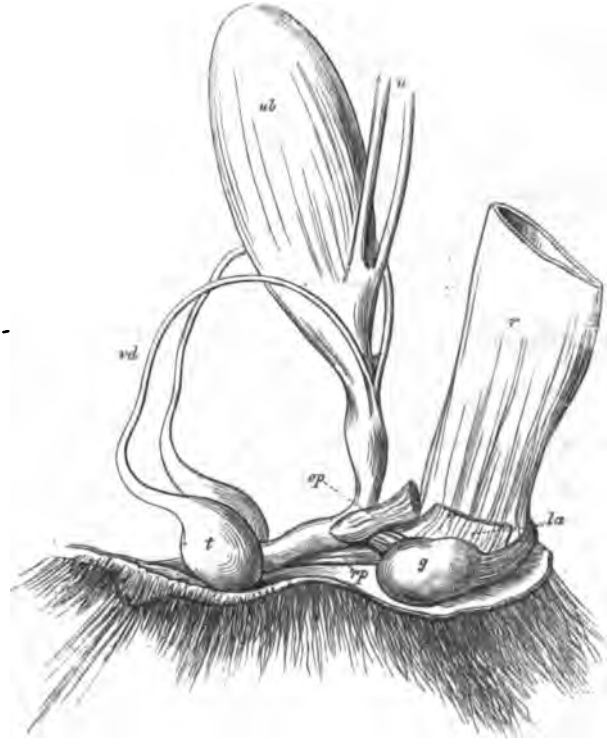
Organs of generation.—Externally the generative organs are small and inconspicuous (see fig. 9). On the hinder part of the under surface of the abdomen, 2½ inches in front of the anus, is a short conical prepuce, directed forwards, and projecting scarcely more than ¼ inch above the level of the surrounding skin; it is nearly naked, and pale-coloured, but it has a few long stiff hairs growing around the orifice on its summit. Behind this the penis forms scarcely any appreciable median prominence. There is no proper scrotum; but the testes form distinct rounded prominences, about ½ inch in diameter, under the skin, with a flat interval of

* In *Nasua* this is of relatively larger size.

† In *Nasua* the proportions of these lobules are very similar.

$\frac{1}{5}$ inch between them; they are placed rather nearer to the orifice of the prepuce than to the anus.

Fig. 9.



Side view of pelvic viscera; three-fourths the natural size.

t. Testicle. *vd*. Vas deferens. *ub*. Urinary bladder. *u*. Ureter. *r*. Rectum. *ep*. Erector penis muscle. *rp*. Retractor penis. *la*. Levator ani. *g*. Anal gland.

The middle of the perineum is more scantily clothed with hair than the rest of the under surface of the body. There is a distinct muscular sphincter beneath the skin around the orifice of the prepuce.

The penis is rather small, being 2″ in length from the junction of the crura to the end of the glans. The latter, when in the non-erect condition, appears to consist (as in the allied genera) of little more than the bone, covered by a delicate lax integument. The orifice of the urethra is rather large, and has a prolonged bilobed inferior lip. The os penis (fig. 10) is ·9″ long, curved, with the convexity downwards or towards the urethra, slender but thicker behind than in

front, rounded posteriorly, compressed in the middle, where it is triangular in section, broad above and narrow below, the sides being longitudinally grooved, and rather depressed and spatulate at its anterior extremity*.

Fig. 10.



Bone of the penis; natural size.
a. Dorsal surface. *b*. Side view.

The portion of the urethra between the urinary bladder and penis is fusiform, the walls being thickened, but presents no distinct salient prostate gland. The vasa deferentia enter near the middle of this portion; and there are neither vesiculæ seminales nor Cowper's glands, —*Ælurus* agreeing in all these respects with the other arctoid carnivores. The testes are ·8″ in length, and ·5″ in greatest thickness.

Anal glands†.—In the usual position, on each side of the termination of the rectum, is an oval or, rather, pyriform body (*g*), with its broadest end directed forwards, ·8″ in length and ·5″ in greatest thickness. It has a thin muscular covering developed out of the sphincter ani, and which is prolonged backwards as a strong muscular band, encircling the anus posteriorly, and in front is inserted into the under surface of the penis at the junction of the crura. The levator ani (*la*) is inserted just above the sphincter, in the fissure between it and the muscular coat of the rectum. The retractor penis (*rp*) arises from the anterior surface of the rectum, just below, or external to, the anterior portion of the sphincter.

Each gland is a very thin-walled capsule, with a smooth, rather shining, lining membrane, and was filled with a soft, cheesy, yellowish-white substance. Its orifice is placed rather in front of the middle of the sac, and opens just within the lateral margin of the anus.

A circle, an inch in diameter, around the anus is quite free from hair, and covered with a soft, pale-coloured, corrugated skin, with numerous large sebaceous glands. There is no supra-anal follicle or group of glands.

* In the relative size and form of the os penis, *Ælurus* rather resembles the true Bears than the typical *Procyonidæ*, in all of which animals this structure is very greatly developed and usually bilobed anteriorly. In *Procyon* it is 4″ in length, in *Nasua* 3″ to 3¼″, and in *Bassaris* 2″.

† The existence of these glands is denied by Hodgson, *loc. cit.* p. 1124. The same author remarks that *Ælurus* is free from all offensive odour; but Dr. Simpson (P. Z. S. 1869, p. 507) says that it has "the power of emitting a strong odour of musk when excited."

Conclusion.

With reference to the skeleton, I must content myself on the present occasion with noting that the vertebral formula is C. 7, D. 14, L. 6, S. 3, C. 18*, that there is no trace of a clavicle, and that the humerus has a supracondylar perforation.

It will be seen from the foregoing notes that, in all essential points of its structure, *Ælurus* conforms to the other arctoid or bear-like carnivora, a group comprising the *Ursidæ*, *Procyonidæ*, and the *Mustelidæ*. The question remains whether it can be included in either of those three families, or whether it must constitute a family for itself.

In the structure of the viscera, the minor modifications from the general type characteristic of the section have not yet been studied with sufficient attention, or in a sufficient series of species, to be made use of in dividing the families or genera. This, however, is a subject to which the attention of systematic zoologists will naturally be more closely directed when the consideration of the external and more easily accessible characters becomes exhausted, or fails to supply the required information.

In the mean time, the dental characters, and more especially the number and form of the true molars, are generally relied on as, at all events, the most convenient for diagnosis. All the known *Ursidæ* have $\frac{3}{3}$ of these teeth on each side, all the known *Procyonidæ* $\frac{2}{2}$, and all the known *Mustelidæ* $\frac{1}{1}$, or in one case but $\frac{1}{+}$.

The *Ursidæ* are characterized by the greatest development of the molar series backwards; for not only is there an additional molar in the lower jaw, wanting in all the other forms, but the posterior molar in the upper jaw is a very large tooth; and in all the most typical, or, rather, most specialized, Bears (*Ursus* proper) it is actually longer from before backwards than the tooth in front of it. In *Melursus*, and the section of *Ursus* called *Helarctos*, this tooth is scarcely, if at all, longer than the one in front of it; and the same is the case in the very generalized extinct *Hyænarctos*. In the *Procyonidæ*, on the other hand, it is always smaller than the tooth in front of it, thus indicating a transition to the condition of total absence met with in all the *Mustelidæ*.

The existing *Ursidæ* also differ, not only from the *Procyonidæ*, but from all other Carnivora, in the structure of the last upper premolar, or "sectorial tooth" of the more typical members of the order. This tooth usually consists essentially of a more or less compressed and cuspidated "blade" supported on two roots, and an inner lobe (almost always near the anterior end of the blade) supported by a distinct root. In the *Ursidæ* alone the third root is wanting, and the inner lobe is either absent or quite at the posterior end of the blade, supported on a thickening of the posterior root †.

* Hodgson gives thirteen dorsal and five lumbar vertebræ, but states that he had not a perfect skeleton by him to refer to while writing.

† In a specimen of *Melursus labiatus* in the Museum of the Royal College of Surgeons there is a small third root on the inner side of the last upper premolar, but this is confined to the tooth of one side of the jaw only.

The tooth is also, relatively to the others, much smaller than in the rest of the Carnivora. In the *Procyonidæ* the sectorial has a very broad inner lobe, usually with an anterior and a posterior cusp, and is supported by a distinct third root, median in position as regards the blade. In *Ælurus* the inner lobe is still larger, having, besides the two cusps, a more internal one upon the cingulum, and is supported by a large antero-median third root. Even the tooth in front of this has a large inner lobe, apparently supported on a third root, which exists in no other carnivore; but this is in conformity with the general characteristic, viz. great transverse breadth, of the whole molar series.

Although the molar teeth of *Ælurus*, at first sight, appear so different from those of any other carnivore, a close examination shows that they are essentially formed upon the same plan as those of *Procyon*, the differences arising from the sharper and more pronounced condition of the cusps, and the greater development and cuspidation of the external and, especially, the internal cingulum. These differences are certainly less than many which occur in different genera of other recognized families, the *Mustelidæ* or *Viverridæ* for example; and it would be difficult to formulate them as family characteristics, especially if the equally aberrant *Cercoleptes* has to be included in the definition of the *Procyonidæ*.

The presence or absence of a bridge of bone on the outer side of the pterygoid plate of the alisphenoid, forming an "alisphenoid canal," through which the external carotid artery passes, has been shown to be remarkably constant in the different minor groups or families of the Carnivora *, all the true *Ursidæ* having this canal, and all known *Procyonidæ* and *Mustelidæ*, without exception, wanting it. *Ælurus* in this respect agrees with the *Ursidæ*, and is separated from the *Procyonidæ*; and though this character must have some importance, it may fairly be considered questionable whether alone it is sufficient to constitute a family distinction.

The exceptional habitat of *Ælurus* may also be taken into account, all the true *Procyonidæ* being confined to the New World; but although it would be more satisfactory in some respects to find structural characters agreeing with geographical distribution, there are too many cases of the contrary to lay much stress upon this circumstance. Both the nearly allied families *Ursidæ* and *Mustelidæ* are very widely distributed, the latter being almost cosmopolitan; and there is no *à priori* reason, except paucity of species, why the *Procyonidæ* should not be so also.

Of the general affinities and position of *Ælurus*, I do not doubt that they are indicated by the place I assigned to it in the diagram of the relations of the existing Carnivora in a former communication (P. Z. S. 1869, p. 37). The only question is whether, as a matter of convenience, we should draw the line which includes the *Procyonidæ* round this Asiatic genus also, or whether, as in that diagram, we should keep *Ælurus* outside that group, as a member of

* See H. N. Turner, P. Z. S. 1848, p. 63; and also W. H. Flower, ibid. 1869, p. 4.

a closely allied but distinct family. This is a point which may still be left open for discussion. Some light will probably be thrown upon it when details are published of the structure of a remarkable new mammal lately obtained in Eastern Thibet by M. l'Abbé David, and briefly noticed by M. Alphonse Milne-Edwards under the name of *Ailuropoda* *. This is a creature as large as some of the smaller species of Bear, but with the dental formula of the *Procyonidæ*, and, as far as can be judged from a slight sketch of the skull kindly sent to me by M. Milne-Edwards, not very distantly related to the animal now under consideration.

The drawings which illustrate this communication have been made from preparations of the viscera of *Ælurus*, which, together with the skeleton, are preserved in the Museum of the Royal College of Surgeons.

3. Remarks on the Habits of the Panda (*Ælurus fulgens*) in Captivity. By A. D. BARTLETT, Superintendent of the Society's Gardens.

On the 22nd of May 1869, the subject of this notice was received at the Gardens. I found the animal in a very exhausted condition, not able to stand, and so weak that it could with difficulty crawl from one end of its long cage to the other. It was suffering from frequent discharges of frothy, slimy fæcal matter. This filth had so completely covered and matted its fur, that its appearance and smell was most offensive.

The instructions I received with reference to its food were, that it had had about a quart of milk per day, with a little boiled rice and grass.

It was evident that this food, the change of climate, the sea voyage, or the treatment on board ship had reduced the poor beast to this pitiable condition.

My first object was to endeavour to support the little life that remained by a change of food. I first tried raw and boiled chicken, rabbit, and other animal substances, all of which it refused to eat.

I found, however, it would take arrow-root, with the yelks of eggs and sugar mixed with boiled milk; and in a few days I saw some improvement in its condition. I then gave it strong beef-tea well sweetened, adding pea-flour, Indian-corn flour, and other farinaceous food, varying the mixture daily. The fondness of the animal for sweet food was remarkable; and by adding a little sugar to the meat that had been boiled to make the beef-tea, it was induced to eat it freely.

Finding a great improvement in the strength of the Panda, and the weather being fine, I gave him his liberty, by letting him out of his cage into the garden in front of my house (having a boy to see that he did not escape); he soon began to eat a few leaves and the tender

* Annales des Sciences Naturelles, 5e séries, vol. xiii. (1870) p. 18.

shoots of the roses, and, finding some unripe apples that had fallen from the trees, greedily devoured them. I had a fear they might disagree with him; this, however, was not the case, for he rapidly improved in condition. At night his usual supply of beef-tea &c. was given to him in his cage; and this was always consumed by morning.

We have in the Gardens two or three trees upon which grow bunches of yellow berries (*Pyrus vestita*). Upon giving some of these to the Panda, I noticed his fondness of them. He would grasp the bunch in his paw, holding it tightly, and bite off these berries one by one; so delighted with this food was he, that all other food was left as long as these berries lasted. I have every reason to believe that berries, fruit, and other vegetable substances constitute the food of this animal in a wild state.

It was upon this food the animal became more vigorous, and the old ragged and matted coat was thrown off, and the beautiful new fur began to grow rapidly. One important operation was performed almost every morning, that of a shower-bath, administered by means of a garden-syringe; this was done before letting him out of his cage; it induced him to bask in the sun, to clean and dry himself. The biting, scratching, and shaking to get rid of the old and clotted fur was a sure sign of good health. Animals recovering from sickness show signs of improvement by their attempts to clean themselves; and it is of the utmost importance to aid them, by judicious means, to accomplish this object. Many valuable animals are lost in consequence of their neglected condition; they fret and die more on account of the filth about them than from actual disease, although disease is a sure attendant upon animals allowed to become filthy.

This individual was not disposed to become a pet; for, notwithstanding every attempt to induce it to be caressed, it continued to exhibit a rather fierce and angry disposition—probably only an individual peculiarity, and not at all characteristic of the species.

When offended, it would rush at me and strike with both feet, not, like a cat, sideways or downwards, but forward, and the body raised like a bear, the claws projecting, but not hooked or brought down like the claws of a cat; for although the claws are partly retractile, the animal cannot use them in that manner. At the moment of making the attack, it would utter a sharp spitting hiss; this, and a weak, single, squeaking call-note, are the only sounds I ever heard it utter.

Its mode of progression on the ground corresponds with that of the Kinkajou, Otter, and Weasel—running on all fours, or jumping with a kind of gallop, its back rather arched. In climbing, the Panda is not quite so expert in trees as the Kinkajou, the prehensile tail of which renders that animal much assistance in swinging from branch to branch. The Kinkajou has also a far higher intelligence.

In forming an opinion of the affinities of the Panda from its general appearance and habits, as far as it is possible to judge of these by observing an animal in captivity, I am led to remark the strong

resemblance to the Kinkajou in its movements, running, walking, climbing, mode of feeding, and its food.

In drinking, it inserted the lips, and would suck up the fluid after the manner of Bears; it does not lap like the Dog or Cat.

At the same time the fur of the Panda, not only in quality but also in the colour and marking, especially that of the tail, exhibits a remarkable affinity to the Coati, Raccoon, and Binturong.

I am, however, more inclined to think its affinities are greater with the Kinkajou than with any other animal. The Coati and Raccoon are far more carnivorous than the Panda, Kinkajou, or Binturong; they are also less nocturnal than these last mentioned species.

In the use of the front paws the most perfect of the animals alluded to in this paper is perhaps the Raccoon, of which the naked toes form a strong contrast with the thickly muffled foot of the Panda—the fur covering the whole of the underside of the foot of this animal, except a space about the size of a small pea in the middle pad. This thick clothing of the paw would lead one to doubt whether the Panda would grasp with its paw as firmly and perfectly as I have seen it do.

The eyes of the Panda are small and Bear-like. It does not appear to have the power of smelling well developed, like the Coati or Raccoon; it is also much slower in all its movements than those animals.

I must not omit to remark that the voice of the Panda, Kinkajou, Otter, and Coati are wonderfully alike, especially the short faint squeak, or call-note.

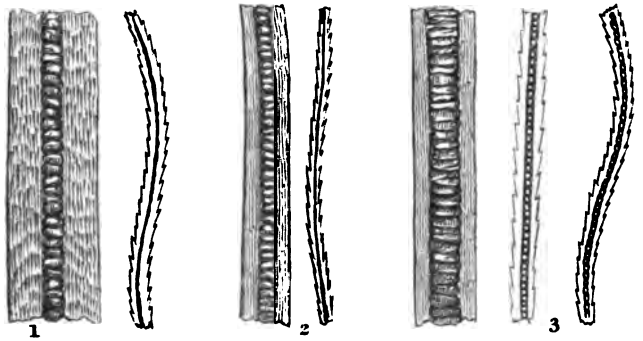


Fig. 1. Hair and wool of *Ursus piscator*, magnified.
2. Hair and wool of *Cercoleptes caudivolvulus*, magnified.
3. Hair and wool (two varieties of) of *Ailurus fulgens*, magnified.

I have submitted a small portion of the hair or fur of the Panda to my friend Mr. Richter, in order to have it examined under the microscope, and to obtain his opinion.

I will read an extract from his letter, which was accompanied by the drawing which I now exhibit.

"I have examined the hair of the Panda, and compared it with that of some of the Bears. I send you a sketch of some of these hairs. The Panda is evidently a more woolly animal than most of the Bears, and its hair shows a larger development of the medullary cells; but these differences are of very slight consequence, so little, indeed, that that they might only signify a mere specific distinction. If the hair of the Panda were to grow a little harsher, and include rather less wool, it might, as to construction, be that of a true Bear. You say that the Bear grows its hair in *tufts*; this is certainly the case with the Panda. The hairs of the Panda are quite simple, like those of any other mammal, and each one proceeds from its own follicle; but the follicles being collected into groups, and not evenly dispersed over the surface, the tufted appearance is caused at once.

"I do not know if this is the case with the Kinkajou. I think the Panda's hair is more like that of a Bear than the Kinkajou's."

4. Notes on the Arrangement of the Genera of Delphinoid Whales. By Dr. J. E. Gray, F.R.S. &c.

The *Delphinoidea*, or Toothed Whales, which have teeth in both jaws and a single crescent blower, have been divided by the shape of the skull; and in the 'Catalogue of Seals and Whales' I have attempted to divide them into sections according to the form of the pectoral fin. But the imperfect materials at my command did not enable me to carry out the plan to my satisfaction.

The description of the skeletons of several genera which were before unknown, as that of *Steno* by Mr. Flower, *Pontoporia* by Dr. Burmeister, and the examination of several skeletons which I had not before seen, have enabled me to carry out this plan on a more secure basis; and the result of the examination may be condensed into the following disposition.

Pontoporia, which has the head like *Inia* and *Steno*, has a short fin truncated at the end, like *Plantanista* and *Catodon*, and differs from all these in having linear longitudinal nostrils: *Orca*, for example, which has a skull like many of the other Dolphins, but is so much more ferocious, has a short, broad, rounded fin; and *Beluga* and *Monodon* are peculiar for having a small ovate pectoral fin.

I. Pectoral fin elongate, falcate, acute; hand longer than the arm-bones; fingers very unequal, the second and third being much longer than the other three.

A. Pectoral fins from the sides of the body; the second and third fingers of six or eight phalanges; the head beaked. Iniadæ and Delphinidæ, including the genera *Steno*, *Sotalia*, *Delphinus*, *Clymenia*, *Delphinapterus*, *Tursio*, *Eutropia*, *Orcaella*, *Electra*, *Leucopleurus*, *Lagenorhynchus*, *Feresa*, *Pseudorca*, *Phocæna*, *Acanthodelphis*, and *Neomeris*.

B. Pectoral fins low down on the sides of the body, narrow and elongate; second and third fingers very long, of nine or ten phalanges; head swollen, subglobular. Globiocephalidæ: *Grampus, Globiocephalus, Sphærocephalus.*

II. Pectoral fin short, broad, rounded or truncated at the end, shorter than the arm-bones; second finger rather the longest, the rest gradually shorter, second finger with six or eight phalanges. 1. Orcadæ: *Orca, Ophesia.* 2. Belugidæ: *Beluga, Monodon.* 3. Pontoporiidæ: *Pontoporia.*

5. Remarks on the Genus *Triphoris* (Desh.), with Descriptions of new Species. By W. Harper Pease, C.M.Z.S.

Eighty-eight species of the above genus are known (including the following), distributed as follows:—East Indies and Polynesia, seventy-three; Australia, six; Panama, one; West Indies, four; Mediterranean, two; localities unknown, two.

Of the species described by M. Deshayes inhabiting the island of Bourbon, two are synonyms of Polynesian species; two of those described by Prof. Adams from Panama are synonymous, and the remaining one a *Cerithiopsis* *. I also exclude several described under the above genus, which prove to belong to *Bittium*.

Mr. Hinds having collected a large number of species during the voyage of the 'Sulphur,' classified them according to shape. A more natural and certainly more distinct arrangement would be according to sculpture, with which the disposition of colours also agrees. Of one section, the species are encircled by two or three rows of granules or beads, and the colours regularly disposed; the other, those which are smoothly keeled, colours mottled.

Colours in this genus, and their arrangement, are constant, and may be relied on as a specific guide.

With few exceptions, the specimens from which the descriptions heretofore published have been drawn up were imperfect or immature. In consequence, probably, of greater advantages in collecting, I have obtained perfect specimens of thirty-six species, and of a large number in all stages of growth. The spire becomes developed early and remains constant; the last whorl and outer lip pass through several stages of growth. The young are planulate at base, the shell of a pyramidal form; as the last whorl is developed and assumes its normal form, the outer lip unites at base with the whorl and is produced in the shape of a tubular canal; posteriorly a perforation is formed at its junction with the body-whorl, though frequently only a broad sinus is left. The edges of the perforation are generally slightly everted; and on four species only, so far as I am aware, it is produced in tubular shape, similar to the basal canal, viz. *T. mira-*

* *Teste* Carpenter, P. Z. S. 1863, p. 350.

bilis (Ad.), *T. mirificus* (Desh.), *T. perfectus* (Pse.), and *T. cylindricus* (Pse.). Judging from the names attached to the two former species, they were considered of abnormal form; they present, however, the characters of the genus fully developed. The figures in the 'Voyage of the Samarang' illustrate fairly the different stages of growth; two are mature, viz. figs. 28 and 37.

The following I suppose to be new.

1. TRIPHORIS SIMILIS.

T. turrita, vix subulata, nitida; anfractibus duodecim, seriebus tribus granorum cingulatis, seriebus granulisque æqualibus et regularibus; sutura sulcata; canali basali brevi, verticali; apertura oblique ovata, superne acute angulata; flavescente, serie superna granorum rubida.

Long. 5, diam. 1¾ mill.

Hab. Insl. Kauai.

The above may be distinguished from *bicolor* (Pse.) and also *cinguliferus* (Pse.), to both of which species it is allied, by the upper row of granules only being red. It also differs in sculpture.

2. TRIPHORIS MINIMUS.

T. subulato-turrita, nitida, tenuiuscula, omnino rosacea; anfractibus decem, biseriatim æqualiter granulosis, interstitiis linea granulosa cingulatis; canali basali brevi; apertura subcirculari.

Long. 3, diam. 1 mill.

Hab. Insl. Howland, Insl. Kauai.

The smallest of the genus, so far as known.

3. TRIPHORIS PALLIDUS.

T. elongato-cylindracea, nitida, omnino albida; anfractibus numerosis, triseriatim granulosis, serie mediana minore; sutura lirata; canali basali brevi, recurvo; apertura parva, oblique ovata.

Long. 7, diam. 2¼ mill.

Hab. Insl. Kauai.

A slender species without any peculiar character.

4. TRIPHORIS SULCOSUS.

T. elongato-turrita, nitida; anfractibus tredecim, triseriatim æqualiter granulosis, longitudinaliter tenuiter striatis; sutura late sulcata; canali basali recurvo; apertura subcirculari, fere verticali; alba, serie superiore granorum fusca, sutura interdum fusca.

Long. 7½, diam. 2½ mill.

Hab. Insl. Kauai.

5. TRIPHORIS GRACILIS.

T. subulata, solida; anfractibus quatuordecim, biseriatim æqualiter granulosis; interstitiis linea tenui gr

et tenuissime striatis; canali basali brevi, recurvo; apertura fere circulari; rubida, serie inferiore granorum cerea.

Long. 8, diam. 2½ mill.

Hab. Ins. Kauai.

The striking contrast between the circle of waxen-coloured beads on a dark red renders the above species conspicuous and easily recognizable.

6. TRIPHORIS PERFECTUS.

T. turrita, tenuiuscula, nitida; anfractibus decem, cingulis duabus granorum ornatis, serie inferiore majore, moniliformi; sutura sulcata; canali basali oblique recurvo; canali posteriore tubulato, elongato, clauso, repando; apertura circulari; alba, serie superiore granorum rufescenti-fusca.

Long. 4, diam. 1¼ mill.

Hab. Ins. Kauai.

I have attached the above name to this species, as it represents the genus fully developed.

T. mirabilis (C. B. Ad.) and *T. mirificus* (Desh.) are of the same type.

7. TRIPHORIS PUNCTATUS.

T. elongato-turrita, solida; anfractibus quatuordecim, tricarinatis, carina mediana multo minore, interstitiis valde punctatis; sutura sulcata, lævi; apertura subcirculari; alba, pallide fusco et rosaceo irregulariter maculata.

Long. 9, diam. 2¾ mill.

Hab. Ins. Annaa.

The above may be recognized by the deep punctures between the spiral keels, and smooth sutures.

8. TRIPHORIS COSTATUS.

T. subulata, solida, transversim costata, costis æqualibus, regularibus, contiguis, subgranosis, planulatis; sutura incerta; canali brevi, recurvo; apertura subcirculari; basi albida, spira cinereo-fusca.

Long. 8, diam. 2½ mill.

Hab. Ins. Annaa.

This species is made up of a series of equal-sized ribs, closely contiguous, rather plane, and somewhat granose; I have not been able to determine where the suture runs.

9. TRIPHORIS ROBUSTUS.

T. abbreviato-subulata, solida; anfractibus decem, biseriatim æqualiter granosis, longitudinaliter tenui-striatis; interstitiis suturaque linea subgranulosa spiraliter cingulatis; canali basali brevi, recurvo; apertura subcirculari; seriebus granorum albido, fusco et flavo maculatis; sutura lata, rosacea.

Long. 6, diam. 2¼ mill.

Hab. Ins. Makaimo.

10. TRIPHORIS CYLINDRICUS.

T. elongata, gracilis, cylindracea, solida; anfractibus numerosis, triseriatim granulosis, serie mediana minore, transversim tenuissime striatis, ad basin punctulatis; canali basali brevi, recurvo, canali posteriore apertura clausa, tubulato, subcirculari; omnino alba.

Long. 12, diam. $2\frac{2}{4}$ mill.

Hab. Ins. Apaiang.

An elongate slender shell, the only one of large size, of which the posterior canal is closed and produced in tubular form.

11. TRIPHORIS GRANOSUS.

T. elongato-subulata, solida; anfractibus biseriatim æqualiter granulosis, interstitiis linea granulosa cingulatis; canali basali brevi, valde recurvo; apertura subcirculari; pallide fusca, granulis albis.

Long. 6, diam. $1\frac{3}{4}$ mill.

Hab. Ins. Tahiti.

12. TRIPHORIS TUBERCULATUS.

T. subulata, solida; anfractibus duodecim, triseriatim granulosis, serie mediana paulo minore, canali basali brevi, recurvo; apertura subcirculari; fusco alboque irregulariter maculata.

Long. 8, diam. $2\frac{1}{4}$ mill.

Hab. Ins. Kauai.

This is the only granulated species I have met with on which the colours are not regularly disposed.

13. TRIPHORIS ORYZA.

T. abbreviato-subulata, robusta, solida; anfractibus decem, triseriatim æqualiter granulosis; canali basali brevi, recurvo; apertura subcirculari; apice acuto; lutescens, serie superiore granorum alba; basi fusco bilineata.

Long. 4, diam. $1\frac{1}{4}$ mill.

Hab. Ins. Kauai.

14. TRIPHORIS PUSTULOSUS.

T. elongata, cylindracea, solida; anfractibus tredecim, triseriatim granulosis, serie inferiore minore, longitudinaliter subcostatis, costis supra suturam continuis; sutura concavo-sulcata; lutescens, granis albidis, interstitiis granorum rubidis.

Long. 11, diam. $2\frac{1}{2}$ mill.

Hab. Ins. Kauai.

The interstices between the granules being stained with red gives the shell a pustulated appearance.

The granules follow each other in regular succession, one under the other, and connected with each other, and over the suture as well, by a slightly elevated rib.

15. TRIPHORIS MACULATUS.

T. subulata, robusta, solida; anfractibus decem, triseriatim granulosis, serie superiore multo majore, serie mediana lineari; canali basali brevi, recurvo; apertura subcirculari; serie superiore granorum lutescente, seriebus inferioribus fuscis, albo irregulariter maculatis.

Long. 7, diam. $2\frac{1}{4}$ mill.

Hab. Ins. Kauai.

16. TRIPHORIS BRUNNEUS.

T. subulata, solida; anfractibus duodecim, triseriatim granulosis, interstitiis suturaque punctulatis, serie granorum mediana paulo minore; canali basali oblique producto; apertura obliqua, late ellipsoidea; serie superiore granorum fusca, seriebus inferioribus cineraceis.

Long. 7, diam. $2\frac{1}{4}$ mill.

Hab. Ins. Apaiang.

17. TRIPHORIS GRACILIS.

T. elongato-cylindracea, solida, nitida; anfractibus quatuordecim, longitudinaliter irregulariter costulatis, triseriatim spiraliter granulosis, granis æqualibus, longitudinaliter costulis convexis; canali basali brevi; rosacea, serie superiore granorum pallida.

Long. 7, diam. $1\frac{3}{4}$ mill.

Hab. Ins. Kauai.

6. Note on Abnormities in the Neuration of the Hind Wings in *Acræa andromacha*. By A. G. BUTLER, F.L.S.

I have recently had occasion to look into the structural characters of the butterflies constituting the subfamily Acræinæ, and whilst so doing I have discovered a fact of great interest and some importance with regard to the neuration of *Acræa andromacha*, Fabr.

I have carefully examined eighteen specimens of the above species, and found aberrant characters in three of them; they differ from each other and from the typical form as follows:—

1. Differs from typical form in the possession of a short spur, about $\frac{1}{16}$ of an inch in length, emitted from the inner edge of the first subcostal branch of hind wing at about $\frac{1}{3}$ of its length from its origin; only occurs on the left-hand wing.

2. Differs from preceding in the length and position of the spur, which measures about $\frac{1}{8}$ of an inch, and is emitted at about $\frac{1}{3}$ of the length of the subcostal from its termination.

3. Differs from first form in the possession of a spur about $\frac{1}{8}$ of an inch in length emitted from inner edge of subcostal in right-hand wing and in a position exactly corresponding to the spur of the left-hand wing.

When I first observed a spur from the subcostal in form 1 of the above species, I supposed that it was an ordinary monstrosity; but finding that exactly one-sixth of the specimens in the Museum collection possessed the same character, more or less developed from the same nervure, I thought it a fact of some significance and worthy of being recorded. It is well known that the greater number of the genera of diurnal Lepidoptera are founded upon neural characters, and in the genus *Ithomia* the species are separated chiefly by slight modifications in the venation of the hind wing. If, then, any species can be proved to exhibit inconstancy in the venation of its hind wings, it must, at the least, cast the shadow of a doubt upon the value of species which are precisely alike in every character but this.

Secondly. I think the above modifications interesting, as showing how characters do occur which, if of any advantage to the species, may be further developed by natural selection, and thus result in forming distinct genera. In a paper which I have recently published upon the genera of the Pierinæ (a subfamily which I maintain to be most constant in neuration) I have found it necessary to divide the genera into three groups, distinguished from each other by the number of branches to the subcostal nervure in the front wings; an additional branch to the subcostal in the hind wings would be quite as important a character, and would have the effect of widely separating two genera, otherwise allied, in any systematic arrangement founded upon structural characters.

7. Description of a New Indian Lizard of the Genus *Calotes*. By Dr. A. GÜNTHER, F.Z.S. &c.

(Plate XLV.)

Mr. Jerdon has brought home with him a considerable number of examples of Khasyan *Calotes*, and has convinced me that two species have been hitherto confounded under the name of *Calotes maria* (Gray). The one has the scales of the throat of rather small size; the supertympanic series of spines is at a distance from the tympanum; the nuchal spines are narrow, slender, very rigid, and not flexible; besides, this form has never a black streak through the eye. To this form belongs the largest of the four typical examples of *Calotes maria*, which name, therefore, must be retained for it. Mr. Blyth's diagnosis of his *Calotes platyceps* agrees entirely with this form, and not with the next, as supposed by Mr. Jerdon (Proc. As. Soc. Bengal, 1870, p. 77).

The second form, Mr. Jerdon informs me, remains always of smaller dimensions; the nearly perfect identity of coloration of certain specimens with others of *C. maria* is a very surprising fact, the differences from this species being solely structural. Its gular scales are large; the supertympanic series of spines is immediately above


A
B



J.Smit lith.

M&N Hanhart imp.

1. CHLOROSPIRGUS GOERINGI.
2. DIGLOSSA GLORIOSA.



J. Smit. lith.

M&N Hanhart imp.

UROCHROMA DILECTISSIMA.

the tympanum; the nuchal spines are low, broad, triangular, strongly compressed laminæ; specimens with black radiating streaks through the eye are very common. This form requires to be named; and I have great pleasure in dedicating it to Mr. Jerdon, who of late years has worked so successfully to supplement and correct the observations made by him many years ago. This species will stand as *Calotes jerdoni*.

For the accompanying illustration (Plate XLV.) I have chosen specimens with different ornamental colours, the bright coloration of the head of the male of *C. maria* being peculiar to this sex during the breeding-season.

8. On Venezuelan Birds collected by Mr. A. Goering. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.L.S.—Part IV.*

(Plates XLVI., XLVII.)

In our last article on Mr. Goering's collections we spoke of his intended expedition into the Sierra Nevada of Merida. The collection made by Mr. Goering during this journey has lately been received in this country, and we now proceed to give an account of it.

As we have already stated, Mr. Goering reached Merida by way of the Lake of Maracaibo and Zuliar, arriving in that city on the 5th of April, 1869. From that date until the following August the weather was unusually dry.

From Merida Mr. Goering made excursions to the Paramos de la Culata, which lie on the ridges to the north of the city, and also to the Sierra Nevada, which overhangs it on the south. He also visited the Laguna de Urao, or Natron Lake, which lies some miles to the west of Merida, and the Puente Natural, or Natural Bridge, of Copas, north-west of Merida on the River Copas, which flows into the Lake of Maracaibo, where there is a nesting-place of *Steatornis caripensis*.

Leaving Merida on the 30th of October, 1869, Mr. Goering set out to return by land to Puerto Cabello, intending to collect *en route*. But on reaching Carache a revolution broke out, which rendered it necessary for him to retreat to the Lake of Maracaibo, and so by sea to La Guayra.

In Merida and its vicinity Mr. Goering formed a collection of 135 specimens of birds, which are referable to 106 species. Amongst these, as will be seen by the subjoined list, are many of great interest to the naturalist, and not less than nine which appear to have been hitherto undescribed†. This is hardly to be wondered at when we

* See Part I., P. Z. S. 1868, p. 165; Part II., P. Z. S. 1868, p. 626; and Part III., P. Z. S. 1869, p. 250.

† *Setophaga albifrons.*
Diglossa gloriosa.
Chlorospingus goeringi.
Buarremon meridæ.
Grallaria griseonucha.
Ochthoëca superciliosa.
—— *nigrita.*
Conurus rhodocephalus.
Urochroma dilectissima.

consider that no zoological collector has, so far as we are aware, previously visited Merida, although certain well-known botanists (Messrs. Linden, Funk, and Schlim), in search of Orchids, devoted a certain amount of attention to the *Trochilidæ* of that district, and discovered several brilliant new species of this group, which have been described by Bourcier, Parzudaki, and other authors.

We now give a complete list of the species obtained by Mr. Goering, to which are added descriptions of the new species, and remarks upon such of the known ones as call for observation.

The nomenclature adopted is, as in former papers, that of Sclater's Catalogue of American Birds.

Fam. Turdidæ.

*1. *Turdus albiventris*, Spix. ..... Merida.
*2. *Turdus serranus*, Tsch. ..... Merida.

Fam. Cinclidæ.

*3. *Cinclus leuconotus* ..... Merida.

Fam. Troglodytidæ.

*4. *Heleodytes griseus* ..... S. E. of Merida.
*5. *Henicorhina leucophrys* ..... Merida, Upper wood-region.

Fam. Motacillidæ.

6. *Anthus bogotensis* ..... Upper Paramo region, Merida.

Fam. Mniotiltidæ.

7. *Mniotilta varia* ..... South of Merida.
8. *Dendræca blackburniæ* ..... Lower wood-region, Merida.
9. —— *striata* ..... Merida.
10. *Protonotaria citrea* ..... South of Merida.
11. *Basileuterus bivittatus* ..... Merida.
12. —— *nigricristatus* ..... Merida.
13. *Setophaga ruticilla* ..... Merida.
*14. —— *albifrons*, sp. n. ..... Upper wood-region, Sierra Nevada.

Fam. Cœrebidæ.

15. *Diglossa albilateralis* ..... Lower wood-region.
*16. —— *gloriosa*, sp. n. ..... Paramo de la Culata.
17. *Conirostrum sitticolor* ..... Paramo de la Culata.

Fam. Tanagridæ.

18. *Chlorophonia pretrii* ..... Merida.
19. *Euphonia nigricollis* ..... South of Merida.
20. *Diva vassori* ..... High wood-region of Merida.
21. *Pipridea venezuelensis* ..... Merida.
22. *Calliste cayana* ..... Merida.
23. —— *cyanicollis* ..... South of Merida.
24. *Pœcilothraupis lacrymosa* ..... Merida.
25. *Tanagra auricrissa* ..... Merida.
26. *Ramphocœlus dimidiatus* ..... South of Merida.
27. *Nemosia ruficeps* ..... South of Merida.
28. *Chlorospingus albitemporalis* ..... Merida, high wood.
29. —— *xanthophrys* ..... Merida.
*30. —— *ignobilis* ..... Paramo of Merida.
*31. —— *goeringi*, sp. n. ..... Paramo of Merida.

*32. *Buarremon meridæ*, sp. n. ..... Merida.
33. —— *schistaceus*..... Upper wood-region of Paramo de la Culata.

Fam. Fringillidæ.

*34. *Phrygilus unicolor*..... Paramo of Merida.
*35. *Chrysomitris xanthogastra* ..... Merida.
36. *Icterus giraudi* ..... Merida.
37. *Dolichonyx oryzivora* ..... Merida.

Fam. Corvidæ.

*38. *Cyanocitta armillata*..... Paramo of Culata.
39. *Cyanocorax affinis*, Pelz. ..... S. E. of Merida.

Fam. Dendrocolaptidæ.

*40. *Cinclodes fuscus*..... Paramo of Merida.
41. *Synallaxis castanea*, Scl. ..... Forest of Sierra Nevada.
42. —— *gularis* ..... Upper wood-region of Culata.
43. *Pseudocolaptes boissoneauti* ..... Upper wood-region of Sierra Nevada.
44. *Margarornis squamigera* ..... Paramos of Merida.
45. *Xiphocolaptes promeropirhynchus* . Upper wood-region of Merida.
46. *Dendrornis triangularis* ..... Upper wood-region of Merida.
47. *Picolaptes lacrymiger* ..... Merida.

Fam. Formicariidæ.

48. *Grallaria ruficapilla*..... Upper wood-region of Merida.
*49. —— *griseonucha*, sp. n. ..... Paramo of Culata.

Fam. Tyrannidæ.

50. *Ochthoëca fumigata* ..... Upper wood-region of Merida.
*51. —— *superciliosa*, sp. n. ..... Paramo of Merida.
52. —— *diadema* ..... Upper wood-region.
*53. —— *nigrita*, sp. n. ..... Merida.
54. —— *setophagoides* ..... Paramo of Merida.
55. *Serpophaga cinerea* ..... Higher mountain-region.
56. *Tyranniscus nigricapillus*..... S. of Merida.
57. ——, sp. ign.† ..... S. of Merida.
58. *Elainea*, sp. ign.‡ ..... Merida.
59. *Myiobius flavicans*..... Merida.
60. *Contopus brachytarsus* ..... Merida.
61. *Myiochanes ardesiacus* ..... Merida.
62. *Myiodynastes chrysocephalus* ..... Merida.

Fam. Cotingidæ.

63. *Pipreola melanolæma* ..... Upper wood-region.
64. *Ampelio arcuatus* ..... Upper wood-region.
65. *Heliochera rubro-cristata* ..... Paramos of Culata and Merida.

Fam. Alcedinidæ.

66. *Ceryle amazona* ..... Merida.

Fam. Bucconidæ.

67. *Bucco ruficollis* ..... S.E. of Merida.
68. *Chelidoptera tenebrosa* ..... S.E. of Merida.

† Since described, *infrà* p. 841, as *T. improbus*.
‡ Since described, *infrà* p. 833, as *E. pudica*.

Fam. Trogonidæ.

69. *Trogon personatus*..... Merida.
70. *Pharomacrus antisianus* ..... Merida.
71. —— *auriceps* ..... Merida.

Fam. Caprimulgidæ.

72. *Stenopsis ruficervix* ..... Merida.
73. *Hydropsalis lyra* ..... Merida.
74. *Nyctidromus albicollis* ..... S. of Merida.

Fam. Trochilidæ.

75. *Campylopterus lazulus* ..... Merida.
*76. *Lafresnaya gayi*..... Merida.
77. *Acestura heliodori* ..... Merida.
78. *Oxypogon lindeni* ..... Merida.
79. *Metallura tyrianthina* ..... Merida.
80. *Chrysolampis moschitus* ..... Merida.
81. *Petasophora anais* ..... Merida.
82. —— *cyanotis*..... Merida.
83. *Bourcieria conradi* ..... Merida.
84. *Heliangelus spencii* ..... Merida.
85. *Eriocnemis vestita*..... Paramo of Merida.
86. *Chrysuronia œnone* ..... Merida.
87. *Panychlora stenura* (Cab. et Hein.) Merida.

Fam. Cuculidæ.

88. *Piaya minuta* ..... Merida.

Fam. Ramphastidæ.

89. *Aulacoramphus albivittis* ..... Merida.

Fam. Picidæ.

90. *Chloronerpes rubiginosus* ..... Merida.
91. *Colaptes rivolii* ..... Paramos of Merida.

Fam. Psittacidæ.

*92. *Conurus rhodocephalus*, sp. n. ..... Merida.
*93. *Urochroma dilectissima*, sp. n..... S. of Merida.

Fam. Strigidæ.

94. *Syrnium hylophilum* (Temm.) ... Merida.
95. *Scops brasilianus* (Gm.) ..... Merida.

Fam. Falconidæ.

96. *Accipiter bicolor* (Vieill.)..... Merida.
*97. —— *ventralis*, Scl. ..... Merida.
98. *Tinnunculus sparverius*, L. ..... Merida.
99. *Buteo pterocles* (Temm.) ..... Andes of Merida.

Fam. Columbidæ.

100. *Zenaida ruficauda*, Bp..... Merida.
101. *Leptoptila verreauxi*, Bp..... Merida.
102. *Geotrygon linearis* (Prevost) ..... Upper wood-region of Merida.

Fam. SCOLOPACIDÆ.

103. *Actiturus bartramius* (Wils.) ..... S. of Merida.
104. *Tringoides macularia* (Vieill.)..... S. of Merida.
*105. *Gallinago frenata* (Max.)..... S. of Merida, Lagoon of Urao.

Fam. PODICIPITIDÆ.

106. *Podiceps dominicus* (L.) ..... Lagoon of Urao, S. of Merida.

1. TURDUS ALBIVENTRIS, Spix; Scl. et Salv. Ex. Orn. p. 147, t. 64.

A young male of this Thrush from Merida. "Iris clear brownish yellow."

2. TURDUS SERRANUS, Tsch.; Wiegm. Arch. x. pt. 1, p. 280 (1844), et F. P. *Aves*, p. 186.

Merula atrosericea, Lafr. R. Z. 1848, p. 3.

Turdus atrosericeus, Scl. P. Z. S. 1859, pp. 136, 333, et Cat. Am. B. p. 5.

M. Coulon having been kind enough to send us from the Neufchâtel Museum the type specimen of *Turdus serranus* of Tschudi for comparison, we have been enabled to ascertain that this obscure bird is no other than the female or young of the Blackbird hitherto usually called *T. atrosericeus*. Tschudi's type is rather more deeply coloured than a female of the same species in Sclater's collection from Ecuador. There are also some lighter shaft-stripes on the head and wing-coverts, showing indications of immaturity.

The range of this species, therefore, extends over the highlands of Venezuela, Columbia, and Ecuador, into the Sierra region of Peru.

3. CINCLUS LEUCONOTUS, Scl. Cat. Am. B. p. 10, t. 2; Salv. Ibis, 1867, p. 122.

The occurrence of this bird in the vicinity of Merida proves a further northern extension of its range than was previously known. Hitherto we have only met with it in Bogotá collections; but Delattre obtained specimens near Pasto (*cf.* Lafr. R. Z. 1847, p. 68), and Sir William Jardine has an example in his collection which was transmitted to him by Prof. Jameson from the vicinity of Quito.

4. HELEODYTES GRISEUS, Sw.

The single specimen of this species differs from the Venezuelan example in Sclater's collection in having the brownish black of the head extending over the upper portion of the back and the wing-feathers. The secondaries and wing-coverts are edged with coffee-brown of the same shade as the lower back, and rather deeper in hue than the corresponding parts of the Venezuelan specimen. Baird (Rev. Am. B. p. 96) appears to have described a similar specimen from Bogotá in Mr. Lawrence's collection. The differences are not, in our opinion, of sufficient importance to warrant the separation of this race as a distinct species.

5. HENICORHINA LEUCOPHRYS (Tsch.).

See Salvin's remarks on this species, *antea*, p. 181.

14. SETOPHAGA ALBIFRONS, sp. nov.

Supra schistacea, alis caudaque nigricantibus: pileo et lateribus capitis nigris, crista verticali cinnamomeo-rubra, plumis nigro terminatis: fronte, loris et regione oculari pure albis: subtus aureo-flava, tectricibus subalaribus et subcaudalibus et rectricibus duabus utrinque externis pro majore parte albis: rostro et pedibus nigris: long. tota 5·5, *alæ* 2·5, *caudæ* 2·6 *poll. Angl.*

Hab. Upper wood-region of Merida (*Goering*).

Of this distinct species of *Setophaga* Mr. Goering sends us two skins, both obtained in the upper wood-region near Merida. Both are males; but the sexes in this group hardly differ. The iris in one is marked "brown," and in the other "clear brown."

The nearest ally of this new species is *S. ruficoronata* of Kaup, from Ecuador; but in the present bird the front and orbital region are of a pure white instead of a golden yellow.

16. DIGLOSSA GLORIOSA, sp. nov. (Plate XLVI. fig. 1.)

Nigra, uropygio in cinereum trahente, abdomine medio castaneo: tectricibus alarum minoribus et superciliis indistinctis cærulescenti-canis: rostro nigro, pedibus corneis: long. tota 5·2, *alæ* 2·5, *caudæ* 2·2.

Hab. Paramo de la Culata, north of Merida (*Goering*).

Obs. Affinis *D. brunneiventri* ex Peruvia, sed minor et gutture cum pectore superiore nigro differt.

Mr. Goering obtained a single specimen of this distinct new species of *Diglossa* on the Paramo of La Culata, to the north of Merida, where he says it is rare. It is a male, and the iris is marked "dark brown."

30. CHLOROSPINGUS IGNOBILIS.

Sphenops ignobilis, Sclater, P. Z. S. 1861, p. 379, et Cat. p. 160.
Sphenopsis ignobilis, Sclater, Cat. Errata, p. xvi.
Chlorospingus oleagineus, Sclater, P. Z. S. 1862, p. 110.

An accurate examination has satisfied us that Sclater's *Sphenops* (sive *Sphenopsis*) *ignobilis* is founded on a somewhat immature skin of this Tanager. The tail is imperfect, and the bill slightly distorted, which led Sclater to place it among the *Dendrocolaptidæ*!

Mr. Goering sends us one skin of this species from the Paramo of Merida. The iris is marked "clear brown."

31. CHLOROSPINGUS GOERINGI, sp. nov. (Plate XLVI. fig. 2.)

Saturate schistaceus, alis caudaque obscurioribus; pileo et capitis lateribus nigris, superciliis elongatis albis: subtus castaneus, lateribus et ventre imo fuscescentioribus: rostro plumbescente nigro, pedibus pallide corylinis: long. tota 6, *alæ* 2·5, *caudæ* 2·5, *tarsi* 1·1.

Hab. Paramos of Merida (*Goering*).

Obs. Affinis *O. castaneicolli*, Sclater, et ejusdem formæ, quamvis robustior, sed dorso schistaceo et superciliis distinctis, necnon gula tota castanea distinguendus.

Mr. Goering obtained a single male specimen of this fine new species near the boundary of the upper wood-region of the Paramos of Merida. The iris is noted as "dark brown." The contents of the stomach were "small fruits." The bird is said to be "very rare."

32. BUARREMON MERIDÆ, sp. nov.

Supra olivaceus, alis caudaque intus fuscis: pileo toto et nucha castaneis: lateribus capitis nigris: vitta mystacali utrinque alba, a gula linea angusta nigra divisa: subtus læte flavus, lateribus et ventre imo in olivaceum trahentibus: rostro nigro, pedibus obscure corylinis: long. tota 6·5, *alæ* 2·8, *caudæ* 3·2, *tarsi* 1.

Hab. Merida (*Goering*).

Obs. Proximus *B. albifrænato*, sed gula flava nec alba, et fronte pileo concolori, nec nigro, diversus.

But one example of this apparently new *Buarremon* is in Mr. Goering's collection, obtained near Merida in July 1869. It is marked "male; iris reddish brown."

34. PHRYGILUS UNICOLOR (Lafr. et D'Orb.).

Phrygilus unicolor et *P. geospizopsis*, Scl. Cat. Am. B. p. 110.
Chlorospiza plumbea, Ph. et Landb. Wiegm. Arch. 1864, p. 67.

Mr. Goering sends us a pair of this species from the Paramos of Merida. Upon comparing them with a series of eleven specimens in Sclater's collection from various parts of the highlands of Columbia, Ecuador, Peru, and Bolivia, and also with Chilian specimens obtained in the Cordillera of Santiago and transmitted by Herr Landbeck as typical of *Chlorospiza plumbea*, we are of opinion that these birds are all referable to one species, as Sclater has already hinted (*l. s. c.* and P. Z. S. 1857, p. 322).

35. CHRYSOMITRIS XANTHOGASTRA, Du Bus, Bull. Ac. Brux. xxii. pt. 1, p. 152 (1853).

Chrysomitris bryanti, Cassin, Pr. Ac. Sc. Phil. 1865, p. 91; Lawr. Ann. L. N. Y. ix. p. 104.

This Finch was originally described from examples procured near Ocaña in Columbia, not far distant from Merida. We have likewise met with it in Bogotá collections; and in Sclater's cabinet is a skin of the same species obtained by Mr. David Forbes, F.R.S., in Bolivia. Moreover, on comparing it with Costa-Rican examples of *C. bryanti* in Salvin's collection we cannot discover any differences, so that it is evidently a species of wide range, though, apparently, nowhere very common.

38. CYANOCITTA ARMILLATA (G. R. Gray).

Two examples of a *Cyanocitta*, obtained in May 1869 in the

Paramo of Culata, must, we think, be referred to *C. armillata*, a species well known in Bogotá collections.

It is, however, slightly larger than Bogotá skins, and the blue colouring is of a deeper hue, particularly on the upper surface of the tail and wings, which in Bogotá skins have somewhat of a greenish tinge. Mr. Goering notes the legs and bill of this bird as being of a shining black, and the iris as "dark brown."

40. CINCLODES FUSCUS (Vieill.).

Cinclodes fuscus et *C. albidiventris*, Scl. Cat. A. B. p. 149.

After examining Sclater's present series of skins of this bird from Ecuador, Peru, Bolivia, and La Plata, and comparing them with a specimen obtained by Mr. Goering from the Paramo of Merida, we have come to the conclusion that they are all referable to one species, which will include Sclater's *C. albidiventris*. The La Plata specimens (*C. fuscus* verus) are less rufescent above, and have the tail rather greyer.

49. GRALLARIA GRISEONUCHA, sp. nov.

Supra rufescenti-brunnea, alis intus nigricantibus, loris et nucha lata obscure griseis: colli lateribus et corpore subtus intense ferrugineis, lateribus obscurioribus: cauda brevissima, subcaudalibus abscondita: rostro et pedibus obscure corneis: long. tota 6, *alæ* 3·5, *caudæ* 1, *tarsi* 1·9, *rostri a rictu* 1.

Hab. Paramo of La Culata, north of Merida (*Goering*).

Obs. Habitus generalis *G. brevicaudæ*, sed rostro paulo fortiore et crassitie majore: quoad colorem ab omni specie diversa.

Mr. Goering obtained a single specimen of this new *Grallaria* on the Paramo of La Culata in September 1869. It is marked "male, iris clear brown; very rare."

51. OCHTHOËCA SUPERCILIOSA, sp. nov.

Murino-brunnea, alis caudaque nigris: superciliis latis, maculis tectricum majorum alarium terminalibus, et secundariorum marginibus externis cum subalaribus et abdomine toto ferrugineis; rectricis unius utrinque extimæ pogonio externo et crisso albis: rostro et pedibus nigris: long. tota 6, *alæ* 3·2, *caudæ* 2·7.

Hab. Paramos of Merida (*Goering*).

Obs. Proxima *O. fumicolori* ex Columbia, sed superciliis et abdomine ferrugineis dignoscenda.

Two examples of this species are sent by Mr. Goering. Both are females, and were obtained in the Paramos of Merida. The iris in one is marked "clear brown," in the other "brown."

Besides *O. fumicolor*, *O. œnanthoides* (Lafr. et D'Orb.) of Bolivia and *O. polionota* (Scl. et Salv. P. Z. S. 1869, p. 599) of Peru belong to this group of the genus *Ochthoëca*. But both the latter species have the superciliaries *white*.

53. Ochthoëca nigrita, sp. nov.

Cinerascenti-nigra, unicolor; superciliis albis: rostro et pedibus nigris: long. tota 5·2, *alæ* 2·6, *caudæ* 1·8.

Hab. Merida (*Goering*).

Obs. Habitus *O. albidiematis* et *O. citrinifrontis*, sed corpore unicolori ab omnibus diversus.

Mr. Goering sends a single skin of this new species, obtained near Merida. It is marked "male; iris brown." The specimen is evidently a bird of the year.

76. Lafresnaya gayi.

Trochilus gayi, Bourc. et Muls. Ann. des Sc. Nat. de Lyon, 1846, p. 325.

Lafresnaya saulæ, Gould, Intr. Troch. p. 70.

A single specimen of this Humming-bird, sent by Mr. Goering from Merida, has the tips of the otherwise white rectrices bronzy green, and not black as in the majority of Ecuadorean examples usually called *L. gayi*. Judging from Mr. Gould's remarks (Mon. Troch. t. 86, et Intr. p. 70), we much doubt if this slight distinction is sufficiently constant to render specific separation justifiable. But should such be the case, the species from Ecuador must bear the name of *L. saulæ*, and the present bird that of *L. gayi*. Delattre and Bourcier's type of *Trochilus saulæ* (R. Z. 1846, p. 310) was obtained by the former in the environs of Quito. Though no locality is assigned to *L. gayi*, the description is strictly applicable to the present bird.

Out of the thirteen species of Humming-birds collected by Mr. Goering in the vicinity of Merida, it will be observed that no less than five (viz. *Lafresnaya gayi*, *Oxypogon lindeni*, *Bourcieria conradi*, *Heliangelus spencii*, and *Panychlora stenura*) are never met with in the large collections of these birds that are constantly being forwarded from the vicinity of Bogotá. These five species therefore, together with others not yet obtained by Mr. Goering, must be considered peculiar denizens of this branch of the Andean chain; the remainder (eight) of Mr. Goering's species being either of wide range or well-known members of the ordinary avifauna of New Granada, as illustrated by Bogotá collections.

92. Conurus rhodocephalus, sp. nov.

Læte viridis: remigibus intus nigricantibus, extus cærulescentibus; pileo roseo-rubro: ventre medio et cauda tota rubiginoso-rufis: tectricibus subalaribus viridibus: rostro albicante: pedibus obscure corneis: long. tota 9, *alæ* 5·2, *caudæ rectr. med.* 4·5, *ext.* 2·6.

Hab. Vicinity of Merida (*Goering*).

Of this new *Conurus* Mr. Goering obtained two male specimens near Merida. One of these, described above, appears to indicate a species most nearly allied to *C. roseifrons* (Finsch, Papag. i. p. 534), but differing therefrom in the want of the red rump and brown

throat. The second specimen agrees with the first, except in having the coverts of the primary quill-feathers *white*. This, however, we regard as probably due to incipient albinism, as one of the primaries in the left wing is also partially white, and there are likewise traces of the same colour on the under wing-coverts.

93. UROCHROMA DILECTISSIMA, sp. nov. (Plate XLVII.)

Læte viridis, pileo cyanescente: maculis tribus frontalibus et una utrinque postoculari, cum tectricibus alarum externis pro majore parte et campterio toto coccineis: subalaribus flavissimis: gula flavicante: caudæ rectricibus aureis, harum lateralibus viridi limbatis et terminatis; intermediis ad apices nigro late transfasciatis: primariorum tectricibus et remigum omnium superficie superiore nigris, primariis supra viridi extus limbatis, infra fere omnino viridescentibus: rostro flavicante, ad basin plumbeo: pedibus obscure plumbeis: long. tota 6·3, *alæ* 4·5, *caudæ* 2, *tarsi* 0·4.

Hab. South of Merida (*Goering*).

Mr. Goering has, unfortunately, sent us but one skin of this beautiful new Parrot. It is most nearly allied to *U. hueti*, but distinguishable at once from that and every other member of the genus by the scarlet outer wing-coverts, which remind one of the Crimson-winged Parrot of Australia (*Platycercus erythropterus*). The three frontal spots in this species are likewise peculiar. Mr. Goering notes the iris as "bright brownish yellow."

97. ACCIPITER VENTRALIS, Sclater, P. Z. S. 1866, p. 303; Scl. et Salv. Ex. Orn. p. 25, t. 13.

A single adult male example from Merida; agrees with Bogotá skins of *A. ventralis* in Salvin's collection, and is apparently quite distinct from the species obtained by Mr. Goering in his second collection (*cf.* P. Z. S. 1868, p. 632). It is not quite so rufous below as the bird figured in 'Exotic Ornithology.' Mr. Goering notes the irides as yellow.

105. GALLINAGO FRENATA (Max.); Scl. et Salv. Ex. Orn. p. 196.

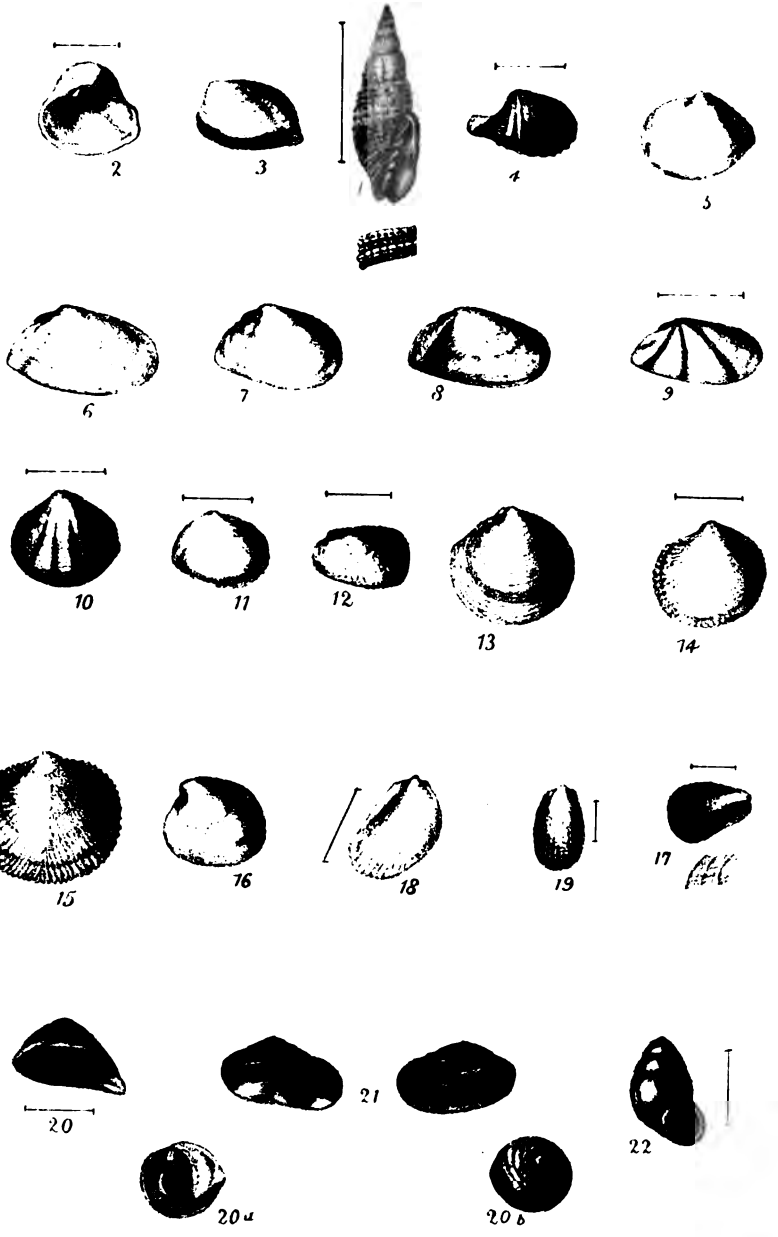
The only Snipe sent by Goering (obtained near the Lagoon of Urao) agrees with Brazilian skins of *G. frenata*.

9. Descriptions of twenty-six new Species of Shells collected by Robert M'Andrew, Esq., in the Red Sea. By HENRY ADAMS, F.L.S.

(Plate XLVIII.)

MITRA (CANCILLA) ANTONIÆ, H. Ad. (Plate XLVIII. fig. 1.)

M. testa subsolida, elongato-fusiformi, costis obtusis, minoribus intervenientibus, et striis longitudinalibus insculpta, albida, fasciis duabus pallide rubris, et super costas punctis fulvo-rubris ornata;



J. D. Sowerby lith.

M & N Hanhart imp.

NEW EXOTIC SHELLS.

spira turrita, apice acuto, rubro; anfr. 9, *convexiusculis, ultimo antice paulum attenuato; apertura angusta, dimidiam longitudinem æquante; columella* 4 *plicata; labro acuto, sulculato.*

Long. 19, lat. 6 mill.

CORBULA ERYTHRÆENSIS, H. Ad. (Plate XLVIII. fig. 2.)

C. *testa solida, ovato-triangulari, subæquilaterali, valde inæquivalvi, concentrice conferte costata, costis postice obsoletis; umbonibus submedianis, tumidis; extremitate antica ovali; extremitate postica truncata; margine ventrali subarcuato.*

Long. 8½, alt. 7½, lat. 5¼ mill.

EUCHARIS ANGULATA, H. Ad. (Plate XLVIII. fig. 3.)

E. *testa solida, triangulari-ovata, convexa, valde inæquilaterali, concentrice rugoso-plicata, alba; umbonibus parvis, ad sextantem anteriorem sitis; latere antico brevi, subtruncato; latere postico acuminato, superne convexo; margine ventrali arcuato; declivitate umbonali valde carinata.*

Long. 13, alt. 9, lat. 8 mill.

NEÆRA (CARDIOMYA) PULCHELLA, H. Ad. (Plate XLVIII. fig. 4.)

N. *testa ovato-pyriformi, ventricosa, tenui, costis* 16–18 *radiantibus ornata, anterioribus confertis, posterioribus distantibus; umbonibus medianis, tumidis, approximatis; extremitate antica ovali, postica valde rostrata, rostro paulum reclivi; margine dorsali convexo; margine ventrali arcuato.*

Long 10, alt. 6, lat. 6½ mill.

This species approaches in form to *N. gouldiana*, Hinds, but is more ventricose, and the dorsal margin is convex instead of being nearly straight as in that species. It differs from *N. singaporensis*, Hinds, in being more ovate, in the rostrum being less produced, and in the radiating ribs being stronger.

TELLINA (PERONÆODERMA) SIMPLEX, H. Ad. (Plate XLVIII. fig. 5.)

T. *testa tenui, acuminato-ovali, compressa, subæquilaterali, sub lente radiatim minutissime striolata, albida; umbonibus submedianis, parvis, prominulis; latere antico ovali; latere postico subtriangulari; margine ventrali arcuato; flexura haud conspicua.*

Long. 14, alt. 10½, lat. 4½ mill.

TELLINA (PERONÆA) PURA, H. Ad. (Plate XLVIII. fig. 6.)

T. *testa tenui, transversa, acuminato-ovata, inæquilaterali, concentrice striata, in medio striis obliquis decussata, albida; umbonibus parvis, vix prominulis; postmedianis; latere antico ovali; latere postico breviore, subtriangulari; margine ventrali arcuato; flexura conspicua.*

Long. 18, alt. 11, lat. 5 mill.

TELLINA (PERONÆA) SCITULA, H. Ad. (Plate XLVIII. fig. 7.)

T. *testa tenui, ovato-trigona, convexiuscula, subæquilaterali, concentrice concinne striatula, albida vel luteo-albida; umbonibus parvis, prominulis, submedianis; latere antico ovali; latere postico subtriangulari, subcompresso; margine ventrali lente arcuato; flexura valida.*

Long. 17, alt. 11, lat. 5 mill.

TELLINA (PERONÆA) ERYTHRÆENSIS, H. Ad. (Plate XLVIII. fig. 8.)

T. *testa tenuiuscula, transversa, convexiuscula, inæquilaterali, concentrice et oblique lirata, pallide carnea; umbonibus postmedianis, parvis; latere antico ovato; latere postico breviore, compresso, antice oblique truncato; margine ventrali antice arcuato, postice fere recto; flexura valde distincta.*

Long. 16, alt. 9½, lat. 6 mill.

TELLINA (PERONÆA) TRIRADIATA, H. Ad. (Plate XLVIII. fig. 9.)

T. *testa tenui, transversa, elongato-ovata, inæquilaterali, concentrice conferte striata, albida, radiis rubris tribus picta; umbonibus ad trientem posticalem sitis; latere antico ovato; latere postico breviore, subacuminato, ad apicem oblique subtruncato; margine ventrali arcuato; flexura satis distincta.*

Long. 11½, alt. 6, lat. 4 mill.

TELLINA (PERONÆA) LACTEA, H. Ad.

T. *testa tenuiuscula, transversa, valde inæquilaterali, concentrice striata, striis posticis lamellosis, et partim oblique striata, lactea; umbonibus parvis, prominulis, ad quadrantem posticum sitis; extremitate antica semiovali; extremitate postica brevi, valde arcuata, infra angulata; margine ventrali rectiusculo; flexura mediocri.*

Long. 10, alt. 6, lat. 3 mill.

TELLINA (ARCOPAGIA) ISSELI, H. Ad. (Plate XLVIII. fig. 10.)

T. *testa tenuiuscula, suborbiculari, convexa, æquilaterali, striis lamellosis numerosis concentricis ornata, pallide lutea, radiis rubris picta; latere antico rotundato; latere postico subangulato; flexura inconspicua.*

Long. 11, alt. 10, lat. 5 mill.

This species very much resembles *T. balaustina*, Linn.; but the posterior side is somewhat more angulated, and the concentric striæ, which are less numerous, are much stronger.

TELLINA (ARCOPAGIA) SAVIGNYI, H. Ad. (Plate XLVIII. fig. 11.)

T. *testa tenuiuscula, subovata, convexa, subæquilaterali, concentrice conferte slriata, striis postice fere obsoletis, albida; umbonibus*

submedianis, parvis; latere antico ovali; latere postico acuminato; margine ventrali valde arcuato, postice subsinuato; flexura distincta.

Long. 10, alt. 8, lat. 5 mill.

A species closely allied to *T. robusta*, Hanley. It is, however, smaller, less convex, thinner, and more ovate than that species.

CORALLIOPHAGA STRIOLATA, H. Ad. (Plate XLVIII. fig. 12.)

C. *testa tenui, subdiaphana, oblongo-ovata, valde inæquilaterali, compressa, area mediana striis elevatis, arcuatis, radiantibus ornata, pallide virente; umbonibus antemedianis, parvis, proximis; margine dorsali antice declivi, postice subrecto; margine ventrali arcuato; latere antico rotundato; latere postico subtruncato.*

Long. 9, alt. 5, lat. 3 mill.

LUCINA FIELDINGI, H. Ad. (Plate XLVIII. fig. 13.)

L. *testa solida, rotundata, convexa, subæquilaterali, concentrice conferte tenuilirata, radiatim subtilissime striata, alba, umbonibus parvis, submedianis, acutis; lunula convexa; latere antico subangulato, latere postico circulari.*

Long. 15, alt. 14, lat. 8½ mill.

LUCINA CONCINNA, H. Ad. (Plate XLVIII. fig. 14.)

L. *testa solidula, rotundata, convexa, subobliqua, radiatim costis crebris, in medio fere obsoletis, et concentrice lirulis confertis insculpta, albida; umbonibus submedianis, prominentibus; lunula magna, lanceolata, vix circumscripta; margine crenulato.*

Long. 9½, alt. 9, lat. 6 mill.

LUCINA ELEGANS, H. Ad.

L. *testa tenui, subrotundata, modice convexa, æquilaterali, striis minutis, confertis, radiantibus, et lirulis subdistantibus concentricis insculpta, alba; umbonibus medianis, prominulis, acutis; lunula parva, cordata, excavata; latere antico subcirculari; latere postico subtruncato; margine crenulato.*

Long. 7, alt. 7, lat. 4½ mill.

LUCINA (CYCLAS) MACANDREÆ, H. Ad. (Plate XLVIII. fig. 15.)

L. *testa solida, rotundata, æquilaterali, ventricosa, costis arcuatis numerosis, radiantibus, divaricantibus, et sulcis concentricis subirregularibus insculpta, costis extra marginem in spinas terminantibus; umbonibus medianis, acutis, anteversis; lunula elongato-cordata, prominente, vix circumscripta.*

Long. 16, alt. 16, lat. 10 mill.

MYSIA TUMIDA, H. Ad. (Plate XLVIII. fig. 16.)

M. *testa oblique rotundata, tumida, tenui, inæquilaterali, striolis confertis radiantibus et concentricis obsolete decussata; umboni-*

bus antemedianis, tumidis, prominentibus; regione postica paulum latiore; margine ventrali oblique arcuato.
Long. 12, alt. 11, lat. 8 mill.

LORIPES PICTA, H. Ad.

L. *testa tenui, orbiculari, ventricosa, æquilaterali, sub lente concentrice obsolete striata, albida, strigis pallide fulvis, interruptis radiatim ornata; umbonibus medianis, elevatis; margine dorsali antice subconcavo, postice fere recto; peripheria reliqua subcirculari; regione postica latiore.*
Long. 11, alt. 10, lat. 7 mill.

CRENELLA (MODIOLARIA) VIRIDULA, H. Ad.

C. *testa ovata, tenui, compressa, viridula; umbonibus parvis, subterminalibus; extremitate antica ovali; extremitate postica rotundata; margine dorsali et margine ventrali arcuatis, paulum divergentibus; areis lateralibus costulis confertis radiantibus, area mediana striis concentricis fere obsoletis insculptis; marginibus internis antice et postice crenulatis.*
Long. 8, alt. 4, lat. 2 mill.

CRENELLA COMPTA, H. Ad. (Plate XLVIII. fig. 17.)

C. *testa tenuiuscula, rhomboidali, striis radiantibus numerosis et lamellis concentricis, acutis, subdistantibus decussata, pallido-fulva, viridi marmorata; umbonibus terminalibus, prominentibus; dorso gibboso; extremitate antica acuminata; extremitate postica lata, obtusa; margine ventrali vix excavato; margine interno crenulato.*
Long. 6, alt. 4, lat. 4 mill.

CRENELLA GIBBA, H. Ad.

C. *testa tenuiuscula, ovato-rhomboidali, striis elevatis, minutis, confertis, radiantibus, et lamellis acutis numerosis concentricis decussata, albido-flava; umbonibus terminalibus, tumidis; dorso gibboso, elevato, ad marginem posticum compresso; extremitate antica acuminata; extremitate postica ovali; margine ventrali fere recto; margine interno crenulato.*
Long. 5½, alt. 3, lat. 4 mill.

AXINÆA (PECTUNCULUS) ARABICA, H. Ad.

A. *testa solida, trigono-ovata, ventricosa, subæquilaterali, albida, interdum pallide rubra, maculis vel strigis brevis, rufo-castaneis picta, epidermide tenui, pilosa, fulgido-castanea induta; valvis radiatim costatis (costis posterioribus fortioribus); costis et intervallis longitudinaliter costulatis, utrisque lirulis concentricis, tenuissimis decussatis; umbonibus submedianis, tumidis; area cardinali brevi, angulata; latere antico rotundato; latere postico angulato; margine dorsali postice declivi; margine ventrali valde arcuato; margine interno crenulato.*
Long. 18, alt. 18, lat. 12 mill.

This species is well figured by Savigny in the 'Description de l'Egypte,' pl. 10. fig. 4, but is not described.

NUCULA INCONSPICUA, H. Ad.

N. *testa subovato-triangulari, solidiuscula, concentrice irregulariter sulcata, radiatim obsolete conferte striata, flavido-alba, glabra; umbonibus posticis; extremitate antica subangulata, postica ovali; margine interno simplici.*

Long. 3, alt. 2½, lat. 2 mill.

RADULA TENUIS, H. Ad. (Plate XLVIII. fig. 18.)

R. *testa tenui, oblique ovata, albida; disco liris minutis, confertis, radiantibus, ad latera distantioribus, ornata; apicibus acutis, elevatis, lævibus; margine byssali subangulato, modice hiante.*

Long. 8, alt. 10, lat. 4½ mill.

RADULA (LIMATULA) PUSILLA, H. Ad. (Plate XLVIII. fig. 19.)

R. *testa tenuiuscula, elongato-ovali, æquilaterali, radiatim costis (in medio fortioribus), et concentrice striis minutissimis, subimbricatis, creberrime ornata, alba; apicibus tumidis, prominulis; auriculis inæqualibus; margine byssali declivi, recto; margine ventrali crenulato.*

Long. 3½, alt. 5, lat. 3 mill.

Note.—I described, in a former paper (P. Z. S. 1869, p. 274), a *Turbonilla* from Vigo under the name of *T. speciosa*. As I find that name to be preoccupied, *macandreæ* may be substituted for it. The same remark applies to a *Tellina* from the Red Sea, which I designated (P. Z. S. 1870, p. 6) *T. virgulata*, and which may be called *T. erythræensis*.

I may add, that among the shells recently brought by Mr. Swinhoe from the interior of China is one which I consider to be a variety of *Helix maacki*, Gertsf., but which differs sufficiently to render the following description of it desirable:—

HELIX (CAMÆNA) MAACKI, Gertsf.

Var. β. UNIZONALIS. *Spira anfractibus minus convexioribus, anfractu ultimo majore, fascia una castanea ad peripheriam ornato.*

Hab. Ichang gorge, China (*Mr. Swinhoe*).

10. Descriptions of two new Genera and five new Species of Shells. By HENRY ADAMS, F.L.S.

(Plate XLVIII.)

Genus PHANETA, H. Ad.

Testa imperforata, trochiformis; spira anfractibus paucis, ultimo carinato, expanso, basi depresso; apertura ampla, rotundata, an-

tice subsinuata, intus margaritacea; columella revoluta, acuta; perist. simplex, rectum.

PHANETA EVERETTI, H. Ad. (Plate XLVIII. figs. 20, 20*a*, 20*b*.)

P. *testa depresso-trochiformi, tenuiuscula, albida, epidermide pallide fulva tenui induta; spira convexo-conica, apice obtuso, sublaterali, sutura distincta; anfr.* 3, *convexiusculis, rapide accrescentibus, striis obliquis obscuris, et striis nonnullis spiralibus, irregularibus ornatis, ultimo acute carinato, basi subconcavo, regione columellari excavato, concentrice conferte striato.*

Diam. maj. 8½, min. 7½, alt. 6 mill.

Hab. Siniwan River, Borneo; attached to submerged logs (*coll. H. Ad.*).

For a knowledge of this very distinct form of fluviatile mollusca we are indebted to Mr. A. Everett, who collected it in the neighbourhood of Sarawak, Borneo. It appears, so far as can be judged from the shell alone, to be allied to the Valvatidæ, in which family, therefore, it may be provisionally placed. The two land shells below described were also found by Mr. Everett in the same locality.

MACROCHLAMYS CUTTERI, H. Ad. (Plate XLVIII. fig. 21.)

M. *testa anguste perforata, depressa, tenui, politissima, lucida, virenti-cornea, supra medium fascia lata fusco-rubra ornata; spira brevissime conoidea, sutura anguste marginata; anfr.* 5½, *convexiusculis, regulariter accrescentibus, ultimo non descendente, rotundato; apertura parum obliqua, rotundato-lunari; perist. simplici, recto, marginibus convergentibus, columellari arcuatim descendente, superne breviter reflexo, perforationem semitegente.*

Diam. maj. 15, min. 13, alt. 9½ mill.

Hab. Busan, near Sarawak, Borneo (*coll. H. Ad.*).

ALYCÆUS GLOBOSUS, H. Ad.

A. *testa perforata, ovato-globosa, tenui, costulis tenuissimis numerosis longitudinaliter ornata, pallide fulva; spira turbinata, apice obtusiusculo, sutura valde impressa; anfr.* 4½, *convexis, ultimo tumido, antice paulum ascendente,* 2 *mill. pone aperturam constricto, tubulum suturalem brevissimum gerente; apertura subobliqua, circulari; perist. duplicato; interno continuo, breviter porrecto; externo patente, ad anfr. contiguum interrupto, supra perforationem angulatim producto et valde reflexo, perforationem fere occultante.*

Diam. maj. 5, min. 3½, alt. 4 mill.

Hab. Busan, near Sarawak, Borneo (*coll. H. Ad.*).

Genus HARGRAVESIA, H. Ad.

Testa subovata, polita, callo nitido obducta; apertura circulari; perist. simplex, subincrassatum, margine dextro juxta insertionem canaliculato.

In this genus, which is in other respects similar to *Pupina*, the canal in the columellar margin is absent.

HARGRAVESIA POLITA, H. Ad. (Plate XLVIII. fig. 22.)

H. *testa imperforata, ovato-acuminata, solidula, lævigata, polita, flavo-fusca; spira convexo-conica, apice acutiusculo, sutura callosa, leviter impressa; anfr.* 6, *convexiusculis, ultimo basi attenuato, spiram æquante; apertura circulari, sursum spectante, callo parietali linguiformi, subobliquo, margine dextro approximato munita; perist. paulum incrassato, ad parietem aperturalem adnato.*

Long. 9½, diam. 6 mill., apert. diam. 3 mill.

Hab. Solomon Islands (*Mr. Hargraves*).

PACHYCHEILUS JANSONI, H. Ad.

P. testa elongato-fusiformi, solidiuscula, sub lente minutissime spiraliter undulato-striata, epidermide nigro-fusca induta; spira subconvexo-turrita, apice eroso, sutura vix impressa; anfr. 6, *subplanatis; apertura acuminato-ovali, testæ fere dimidium æquante, postice angulata, antice paulum producta, intus livido-fusca; columella arcuata, albida; callo parietali tenui; labro crassiusculo.*

Long. 36, lat. 15 mill.

Hab. Province of Chontales, Nicaragua (*Mr. E. M. Janson*).

This species is related to *P. turati*, Villa; but the aperture is longer, and the whorls of the spine are nearly flat instead of being convex as in that species.

DESCRIPTION OF PLATE XLVIII.

Fig. 1. *Mitra* (*Cancilla*) *antoniæ*, p. 788.
2. *Corbula erythræensis*, p. 789.
3. *Eucharis angulata*, p. 789.
4. *Neæra* (*Cardiomya*) *pulchella*, p. 789.
5. *Tellina* (*Peronæoderma*) *simplex*, p. 789.
6. *Tellina* (*Peronæa*) *pura*, p. 789.
7. *Tellina* (*Peronæa*) *scitula*, p. 790.
8. *Tellina* (*Peronæa*) *erythræensis*, p. 790.
9. *Tellina* (*Peronæa*) *triradiata*, p. 790.
10. *Tellina* (*Arcopagia*) *isseli*, p. 790.
11. *Tellina* (*Arcopagia*) *savignyi*, p. 790.
12. *Coralliophaga striolata*, p. 791.
13. *Lucina fieldingi*, p. 791.
14. *Lucina concinna*, p. 791.
15. *Lucina* (*Cyclas*) *macandreæ*, p. 791.
16. *Mysia tumida*, p. 791.
17. *Crenella compta*, p. 792.
18. *Radula tenuis*, p. 793.
19. *Radula* (*Limatula*) *pusilla*, p. 793.
20, 20 *a*, 20 *b*. *Phaneta everetti*, p. 794.
21, 21 *a*. *Macrochlamys cutteri*, p. 794.
22. *Hargravesia polita*, p. 795.

December 6, 1870.

R. Hudson, Esq., F.R.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the months of October and November, 1870:—

The total number of registered additions to the Society's Menagerie during the month of October was 71, of which 2 were by birth, 47 by presentation, 5 by purchase, 4 by exchange, and 13 were animals received on deposit. The total number of departures during the same period, by death and removals, was 108.

The more remarkable animals among the acquisitions were:—

1. Two Red-tailed Guans (*Ortalida ruficauda*) from Tobago, received October 4th, having been presented to the Society by the Hon. W. J. Buhôt, M.D., M.R.C.S., of that island. These are the first examples of this Guan ever received alive by the Society, but were in very poor condition when they arrived. One has since died; but the other seems likely to recover.

2. A fine specimen of Geoffroy's Cat (*Felis geoffroii*), purchased October 10th of Capt. E. Hairby, by whom it was brought from Buenos Ayres, with the information that it had been obtained from Paraguay. On the arrival of this animal I identified it from memory with a specimen I had seen in the British Museum, upon which Dr. Gray had established his *Leopardus himalayanus* (List of Mamm. in B. M. p. 44), and of which he afterwards made a new genus and species under the name *Pardalina warwickii**. Mr. Bartlett, having examined the specimen in the British Museum, confirmed my opinion; and I accordingly entered the animal on the register as Warwick's Cat (*Felis warwickii*†).

The so-called *Felis warwickii* being now dead, I have been able to examine it more carefully, and find it to belong to a well-known South-American species—*Felis geoffroii* of D'Orbigny and Gervais. This Cat was discovered by D'Orbigny on the Rio Negro, and is well figured and described in the 'Magasin de Zoologie' (1844, Mamm. pl. 57), and in D'Orbigny's 'Voyage' (Mamm. p. 25, tab. 14). In the latter work the skull is also figured (pl. 13. figs. 1, 1ª). Burmeister (La Plata-Reise, ii. p. 397) tells us that it is found all over the Argentine Republic in the more wooded districts. The native name is "*Gato montese*"—the *Felis pajeros*, which we have also lately received alive (*cf.* P. Z. S. 1868, p. 530) being designated as the "*Gato de la pampa*."

I have now also myself compared our specimen with the original of *Pardalina warwickii* in the British Museum, and have no doubt of their belonging to the same species. The skull of our specimen, which was a young although fully grown animal, does not, however,

* Cat. Carn., Pach., and Edentate Mamm. p. 14 (1869).

† See 'Field' for 22nd October, 1870, p. 349.

quite agree with the skull of *Felis warwickii*, which is that of a very old individual, being rather shorter (total length from end of præmaxilla to occipital foramen 3·7 inches instead of 4 inches) and considerably narrower in proportion (being only 2·6 inches in extreme width of the zygomata instead of 3·1 inches). But I believe there is considerable variation in the skulls of most species of the genus *Felis*.

Felis geoffroii seems to be nearly allied to the Ocelot (*Felis pardalis*); and I cannot understand what claims it has to be regarded as forming a distinct genus.

Dr. Gray refers to his "*Pardalina warwickii*" Sir William Jardine's figure of *Felis himalayanus* in the 'Naturalist's Library' (vol. xvi. pl. 24*), stating that the figure in question was taken "from the specimen in the Surrey Zoological Gardens." But Sir William Jardine expressly says that his figure of "*Felis himalayanus*" is a copy of a drawing by Mr. Lear, taken from a "skin received from the Himalayan district of India;" and there can be no doubt, I think, that it represents the Viverrine Cat (*Felis viverrina*, Bennett) of India, of which it is, indeed, a very fair representation.

3. Two Spider Monkeys, purchased October 14th, and stated to have been brought from Nicaragua. One of these belongs to the species called in the Catalogue of Vertebrates (ed. iv. p. 8) *Ateles frontatus*, Gray†, which we have more than once received from the same locality‡. The second Spider Monkey, which has since died, and of which I now exhibit the stuffed skin, is apparently of a different species, and unknown to me. There is, however, a similar example in the British Museum, which is, as I am informed by Mr. Gerrard, the type of a proposed new species of Dr. Gray (*Ateles ornatus*), to be described in a forthcoming Catalogue of the Quadrumana.

The total number of registered additions to the Society's Menagerie during the month of November was 32, of which 1 was by birth, 16 by presentation, 7 by exchange, and 8 were animals received on deposit. The total number of departures during the same period, by death and removals, was 118.

Amongst the acquisitions the only animal worth remark was a female of the Antarctic Wolf (*Canis antarcticus*), received November 8th. Mr. H. Byng, the acting colonial secretary of this colony, kindly forwarded a pair of these animals as a present to the Society's Menagerie; but one only survived to reach the Society's Gardens. Mr. Byng states that, as Mr. Darwin (Zool. Voy. Beagle, ii. p. 10) prophesied would probably be the case, this animal, formerly so common, has now become almost extinct in the Falklands, the depredations it commits upon the Sheep having rendered its extirpation necessary. The only previous specimen of this animal, as far as I know, was that brought home by Lecomte in 1868 (see P. Z. S. 1868, p. 529).

† *Brachyteles frontatus*, Gray, Voy. Sulphur, Mamm. p. 9, pl. 1.

‡ See P. Z. S. 1862, p. 186.

In concluding my report for these last two months, I must not omit to record the existence in the Gardens during a part of that period of an example of the *Ka-ka-po*, or Night-parrot of New Zealand (*Strigops habroptilus*). On the 20th of September Mr. G. S. Sale deposited in the Society's care a specimen of this most interesting bird, and removed it on November 3rd, after some unavailing attempts to come to terms with us as to its price. A good illustration of the Kakapo, taken from this bird, was given in the 'Field' for 15th October, 1870 (p. 328); and at p. 411 (November 12th) will be found a notice of its habits by the owner.

The Secretary read the following extract from a letter addressed to him by Dr. R. C. Cunningham, C.M.Z.S., concerning a specimen of the Manatee (*Manatus americanus*) kept alive in captivity:—

"The specimen of the Manatee observed by me at Rio in 1867 and 1869 had been procured, as I was informed, from the Amazons, and was kept in a strip of artificial water in the Passao Publico (Public Gardens) of the city, which was tenanted also by two young Jacares and a variety of water-fowl. It measured, as nearly as I could calculate, between 4 and 5 feet in length. In general it could only be recognized as an inky shadow moving along at some distance below the surface of the water. It evinced a curious predilection for the society of a white Swan, following this bird, which was not at all alarmed by its associate, from place to place, so that we found that the presence of the Swan on any particular spot on the water was a guide to that of the Manatee, or 'Cow-fish' as it is generally termed by the inhabitants of Rio. It was very tame, often protruding its curiously fringed lips above the surface of the water to take bunches of grass from the hands of the bystanders; and several times I observed it grazing on the short herbage at the sides of the water. This it accomplished by raising its head and shoulders above the surface, and maintaining itself in this position by means of one pectoral fin placed on the top of the low stone ledge or parapet which separated the water from the adjoining turf, while it slowly moved along sideways in this position, cropping the grass as it went."

The following (ninth) letter upon the ornithology of Buenos Ayres, by Mr. W. H. Hudson, C.M.Z.S., was read*:—

"Buenos Ayres, June 20th, 1870.

"We are now near the winter solstice, and the weather has become exceedingly mild. This short period of pleasant weather in midwinter is called in Buenos Ayres '*Veranillo de San Juan*,' and is experienced here almost every season. So warm have the last few days been, that the Dusky Thrush (*Turdus leucomelas*) has been heard frequently, though his full delightful song is never put forth till September; but the Cardinal, Black-headed Finch, and Calandria have been singing as if it were really spring.

* For Mr. Hudson's last letter see *antea*, p. 748.

"I have only been able to obtain three specimens of the *Molothrus rufo-axillaris* since receiving your letter asking for some skins of that species: they all proved males; so I shall keep them for you until I have samples of both sexes. I am not yet very well acquainted with the breeding-habits of this bird, but, from what I have observed, strongly suspect that it is polygamous. If this is true, it is a wonderful circumstance that the three *Molothri* of Buenos Ayres should differ from almost all other birds in their weakness or total want of sexual attachment. I hope in summer to be able to discover some additional facts concerning the *M. bonariensis*, also to collect for you some of their eggs, which I am sure you will think interesting curiosities.

"Winter and resident game birds are uncommonly plentiful this season, affording me a good opportunity for securing specimens and observing their habits. As I am fond of gunning, the Duck and Snipe families are favourites. Of the *Scolopacidæ* family I am acquainted with twenty species. Seventeen of these are well known to naturalists, or at least have had their affinities determined; but before writing much about them I should like to become more familiar with some of their habits, especially the times of their arrival and departure, also the nidification of the resident species. The other three are perhaps not known, or not considered natives of this region. I have formerly shot, but never preserved, specimens of two of them. But I will say no more at present about these birds, as memory is not a faithful guide in such matters, and some favourable chance may bring them in my way again.

"It is a remarkable circumstance that the three birds that possess perhaps the widest range of all the species belonging to the fauna of Buenos Ayres should have been uncommonly abundant this autumn. These birds are the *Himantopus nigricollis*, a native of both Americas; the *Otus brachyotus*, called here '*Lechuson*,' and known, I believe, in Asia and Europe as well as in America; and the Glossy Ibis (*Ibis falcinellus*), a bird possessing a still wider range. The Black-necked *Himantopus*, though almost unfailingly found wherever much water occurs on the pampas, is not a numerous species; but at present they are extremely abundant, and quite familiar even in cultivated fields near the farmhouses, flocks of them being seen wherever little pools of water have been formed by the rains. At some future time I will communicate all I have learned from personal observation respecting its habits. Whether the habits of a species (like this bird) distributed over an entire continent become modified by circumstances in the widely separated regions they frequent, or not, must be an interesting subject of inquiry to naturalists.

"The Glossy Ibis is very common all over the State of Buenos Ayres. They appear in spring; but as their movements are very irregular, and many individuals remain through the winter, their migrations are probably not altogether dependent on atmospheric changes. They have a graceful flight; and when migrating, the flocks are seen to succeed each other in rapid succession, each flock being usually composed of from fifty to a hundred individuals, but

sometimes of a much greater number. A body of these birds on the wing is a most interesting sight—now soaring high in the air, displaying the deep chestnut hue of their breasts, now descending with a graceful curve towards the earth, as if to exhibit the beautiful metallic green of their upper plumage. The flock is in the mean time continually changing its form or disposition, as if at the command of a leader. One moment it spreads out in a long straight line; suddenly the birds scatter in disorder, or throw themselves together like a cloud of Blackbirds; as suddenly they again re-form and proceed in the figure of a phalanx, half-moon, or triangle. The fanciful notion will scarcely fail to suggest itself to the beholder's mind, that the birds go through these unnecessary evolutions intelligently to attain greater proficiency in them by practice, or merely to make a display of their aërial accomplishments. The Ibis has another remarkable habit while flying; it is not, however, a habit exclusively confined to this species. The flock is sometimes seen as if seized with sudden frenzy or panic, every bird rushing wildly away from its fellows, and descending with a violent zigzag flight; in a few moments the mad fit leaves them, they rise again, reassemble in the air, and resume their journey.

"I should like to know if any thing has been recorded concerning the nidification of this bird. Having the four quarters of the globe for an habitat, perhaps it is in no country more common than in this; yet its only breeding-place here that I have yet heard of is the Gualicho, a marshy district about 170 miles south of Buenos Ayres city. I have not visited this place in the breeding-season, but have been told by people living in its vicinity that the Ibises breed there in great numbers, and make their nests close together. The nest is made of dry grass on the ground; the eggs are blue, and three in number. Baird, in his 'Synopsis of North-American Birds,' says nothing is known of its nidification; but this may refer to the bird only in North America. I hope from my own observation to find out something more of its breeding-habits in this country. The Lechuson (*Otus brachyotus*), though, like the preceding species, pretty generally distributed over the pampas, was, until within the last three years, rather a scarce bird. It breeds on the ground, makes no nest, but merely clears and presses a circular spot on the ground among the loose tussocks of long grass, and lays four white eggs of a slightly oval form. Near sunset the Lechuson is seen quitting its concealment and sitting perched upon a thistle or other eminence, or sailing above the ground with a slow Heron-like flight; at intervals while flying it strikes its wings together under its breast in a very sudden, quick manner. It is not at all shy, the intrusion of a man or dog at evening in the field it frequents appearing greatly to excite its indignation. An imitation of its cry will attract numbers of them about a person; the report of a gun has the same effect. The language of this species has considerable variety; when alarmed or angry they utter a loud sharp hiss, and at times a sudden shrill laugh-like cry. They have also a dismal hollow scream, not often heard, and at twilight hoot—this part of their vocal perform-

ances sounding not unlike the distant baying of a 'deep-mouthed' watch-dog.

"The late great increase of the large Owls in this neighbourhood can only be ascribed to the recent cultivation of the plains near the city. Within the last six years a great extent of hitherto bald shelterless grounds have been enclosed, and are now yearly planted with wheat and maize; in the fields the Owls find shelter, and their favourite food in abundance, Mice, Partridges, &c.

"The Lechuson frequenting open plains in preference to woods, and hiding by day on the ground, has the colour of its plumage adapted to a country like the desert pampas, rough with a brown vegetation. But the introduction and increase of Sheep quickly changed the aspect of a vast extent of the plain; the long brown grasses disappeared, their place being taken by a tender herbage, short and brilliant green; the country was thus unfitted for their pasturage. All the wild animals have, no doubt, been greatly affected by this sudden change in vegetation and total destruction of cover. But cultivation has now partially restored the physical conditions necessary to the preservation and increase of many species like the Lechuson. In future descriptions I shall frequently refer to these changes on the pampas.

"The gradual increase or diminution constantly going on in many species about us is little remarked; but the sudden appearance in vast numbers of a species not usually common is regarded by all with interest and wonder. When, owing to a season favourable to propagation, a small species multiplies greatly (as often happens here with Mice, Toads, Crickets, &c.), we may confidently look for the appearing of multitudes of those birds that subsist on them. Thus, in the year 1856, when the earth swarmed with Mice, vast numbers of the then scarce Lechuson, and flocks of the Great Adjutant Stork (*Mycteria americana*) also appeared. Armies of these majestic white birds were seen stalking over the grass on all sides, or at the close of day winging their flight to the distant watercourses in a continuous flock; while the night air resounded to the solemn hootings of the innumerable Owls. However simple may be the cause of the first phenomenon (the sudden great increase of a species incapable of migration but exceedingly prolific), the attendant one appears to have been remarked with astonishment from very early times, and to have given rise to many conjectures. Pliny, if I remember right, relates that one season in some part of Asia Minor the Mice increased in an extraordinary manner, but soon appeared 'an army of strangely painted birds' and devoured them all. Birds of prey and those that subsist on large insects, and possess great powers of flight, without being strictly migratory, when not occupied with the business of propagation, are incessantly wandering in quest of food. They often fly high, and traverse vast distances. When the natural food of any one of such species abounds very much in a particular region, all the birds that discover it remain in it and continually attract to them all of their kind passing over them. It

thus happens here with the large Owl, the Adjutant, and other species that fly singly or in small flocks: a few first appear like harbingers; these are soon joined by new comers in considerable numbers; and before long they are in myriads. Inconceivable numbers of birds are, no doubt, continually passing over us unseen. It was once a matter of wonder to me that flocks of Swans should almost always appear flying past after a shower, even when none had been visible for a long time before, and when they must have come from great distances. But the simple reason soon occurred to me, that after rain a Swan may be visible at a vastly greater distance than during fair weather, the sun shining on its snow-white plumage against the dark background of a cloud rendering it very conspicuous. The fact of Swans being seen almost always after a rain is only a proof that they are almost always passing. Whenever we are visited by a great dust-storm, myriads of Gulls appear flying before it; this is invariably the case even when not a Gull has been visible for months. A dust-storm is always preceded by long drought, so that from the watercourses being all dry the Gulls could not well have subsisted in the region over which it passes. Yet in seasons of drought Gulls must be incessantly passing over us, visible only when driven together and forced towards the earth by the violence of the storm. The bird I allude to is the Black-headed Gull (*Larus cirrhocephalus*). In seasons when Grasshoppers abound very much, flocks of these birds also appear, often in such multitudes as to free entire districts from the devastating swarms of the hated insects. It is a fine sight, and a welcome one as well, to see a flight of these birds settle on the afflicted district; at such times their mode of proceeding is often so regular, that a body of them well deserves the appellation of 'an army of birds.' They come down with a swift graceful flight, and settle on the earth with loud joyful cries, but do not abandon when the work of devouring has begun the order in which the flock was disposed. It often presents a front of several thousand feet, with a breadth of but sixty or eighty; all along this line of battle the excited cries of the innumerable birds produce a loud, incessant noise. Every bird is incessantly on the move—some skimming along the ground with half expanded wing, others pursuing the fugitives through the air; and all the time the hindmost birds are flying over the flock and alighting in the front ranks; so that the whole body is steadily advancing, and leaving the earth over which it passes free from the pest. The Black-headed Gull is one of our most common birds, and has many very interesting habits; I hope before long to make it the subject of another letter.

"I remain, Sir,

"Truly yours,

"W. H. HUDSON."

Dr. J. Murie read the second part of his memoir on the Anatomy of the Sea-lion (*Otaria jubata*). The present portion treated of the skeleton and nervous system, vascular and respiratory organs, di-

gestive system, and urino-generative organs of this animal, as observed in the male specimen which died in the Society's Gardens in 1870*.

This paper will be published in the Society's 'Transactions.'

Mr. Gould brought under the notice of the Meeting two species of Humming-birds, which he believed to be new to science, and for which he proposed the names of *Chætocercus bombus* and *Thalurania hypochlora*. They formed part of a collection made by Mr. W. Buckley in the temperate parts of Ecuador during the autumn of the present year, 1870. This collection was remarkable for the absence of many of the species, and even of the forms, inhabiting the high lands around Quito, and for the presence of others which are mostly found in Venezuela, Veragua, and Costa Rica.

The collection comprised about 130 specimens of thirty species, of which the following was a list, with the localities wherein they were obtained:—

Cynanthus cyanurus	Baños.
—— *mocoa*	Baños.
Panoplites flavescens	Citado.
—— *mathewsi*	Baños.
Phæolæma æquatorialis	Citado.
Phaëthornis yaruqui	Baños.
—— *syrmatophora*	Ulva.
Heliotrypha parzudakii	Baños.
Docimastes schliephackei, Heine f.†	Baños.
Heliothrix barroti	Citado.
—— *auritus*	Canelos.
Helianthea lutetiæ	Ulva.
Petasophora iolata	Baños.
—— *cyanotis*	Baños.
—— *delphinæ*	Citado.
Bourcieria torquata	Baños.
Lampropygia cœligena	Ulva.
Urochroa bougieri (?)	Baños.
Metallura tyrianthina	Ulva.
Adelomyia maculata	Ulva.
Heliodoxa jamesoni? (young)	Citado.
Spathura melananthera	Citado.
—— *peruana*	St. Ines.
Pyrrhophæna riefferi	Citado.
Gouldia conversi	Citado.
Chlorostilbon chrysogaster	Citado.
Heliomaster longirostris (?)	Citado.
Thaumantias viridiceps	Citado.
Thalurania hypochlora, n. sp.	Citado.
Chætocercus bombus, n. sp.	Canelos.

Mr. Gould eulogized the zeal and perseverance displayed by Mr.

* See P. Z. S. 1867, p. 243. † Journ. f. Orn. 1863, p. 215.

Buckley in having collected so many species during the very short time he had been in the country, and gave the following descriptions of the two new species:—

CHÆTOCERCUS BOMBUS, sp. nov.

This species must be classed with the most diminutive of the Trochilidæ. In its general appearance and in its coloration it strongly reminds one of *Chætocercus rosæ*, while, in some parts of its structure, particularly in the form of its two hair-like outer tail-feathers, it resembles *Acestrura mulsanti*; its wing is even smaller and shorter than that of the little *A. heliodori*. It must, however, be placed, as I believe it is correctly, in the genus *Chætocercus*.

The following is a more minute description and admeasurement of this little bird.

Male. Crown of the head, upper surface, and abdomen bronzy green; throat brilliant crimson-red, nearly surrounded by a mark of buff, forming a conspicuous band across the chest, a feature distinguishing it from *Chætocercus rosæ*, in which the band occupying the same space is white; wings purplish black; the tail-feathers the same, with the exception of the third or longest on each side, on which there is a very narrow edging of buff near the base of the inner margin; the two outer tail-feathers very fine and hair-like; the four central ones extremely small, so much so as to be hidden beneath the tail-coverts; bill and legs black.

Total length $2\frac{1}{2}$ inches; bill $\frac{9}{10}$, wing $1\frac{5}{10}$, longest tail-feathers $\frac{3}{4}$, tarsi $\frac{1}{8}$.

Female. Larger than the male. Crown and upper surface green; throat and under surface chestnut-brown; tail, which is extremely short and even, deep chestnut-brown, banded with black across the centre of each feather.

Total length $2\frac{1}{2}$ inches; bill $\frac{5}{8}$, wing $1\frac{1}{8}$, tail $\frac{1}{2}$, tarsi $\frac{1}{8}$.

Hab. Citado in Ecuador.

THALURANIA HYPOCHLORA, sp. nov.

The nearest ally to this new species is *Thalurania verticeps*; but from this it differs in having the entire under surface green instead of having a blue abdomen.

Male. Frontal three-fourths of the crown of a beautiful green, which also pervades the entire under surface of the body; all the upper surface deep grass-green, with a lovely patch of blue on the shoulder, extending for a short distance on to each side of the breast; under tail-coverts blackish blue, edged with white; bill black; feet brownish black.

Total length 4 inches; bill $\frac{7}{8}$, wing $2\frac{1}{8}$, tail $1\frac{3}{8}$.

Female. All the upper surface grass-green; throat, abdomen, and under tail-coverts grey, darker and inclining to green on the flanks; tail purplish black, slightly tipped with white, the white tipping being of lesser extent on the central than on the outer feathers.

Size rather less than that of the male.

Hab. Citado in Ecuador.

The following papers were read:—

1. Notes on the Anatomy of *Balænoptera rostrata*. By J. B. PERRIN. (Communicated by Prof. FLOWER, F.R.S., V.P.Z.S.)

A young female specimen of this species, captured in April 1870, at Weymouth, was purchased by Mr. Gerrard of Camden Town, and removed to the dissecting-room of the Zoological Society, where, by permission of the Council and through Professor Flower's kindness, I had the opportunity of dissecting it. With his valuable assistance have I been enabled to make the observations embodied in the following communication.

The anatomy of this species has been so fully described in the Monograph of Carte and Macalister* that it will be only necessary to mention certain peculiarities which this specimen presented.

The following are the principal external measurements:—

Measurements.	ft.	in.
Total length of animal from point of snout to extremity of tail, measured along the dorsal curvature	13	8½
Ditto, in straight line	13	5
From point of snout to base of flipper	4	1
From point of snout to base of dorsal fin	9	1½
From anterior part of dorsal fin to the extremity of the tail	4	7
From point of snout to anterior extremity of blow-hole	1	10
Length of blow-holes	0	5
Length of median sulcus between blow-holes	0	7
From point of snout to anterior angle of eye	2	7½
Length of long axis of ocular aperture	0	2
Length of long axis of palpebral fissure	0	5
From posterior extremity of median basal groove to the eye	1	1¾
Length of upper maxilla from point of snout to posterior extremity of intermaxillary groove	3	3½
Lower jaw measured from apex to the same point	3	6¼
Length of flipper along ventral border, from commencement of basal groove	2	2½
Length along dorsal border from axillary fold	1	9
Girth of flipper at base	1	1¼
Girth of flipper at the distal point of termination of the white zone	1	0¼
Anus is situated at a point corresponding to the posterior part of the ridge at the base of the dorsal fin.		
The mammilla is situated above the anus	0	3½
From anus to the bottom of the fissure in the tail	3	6½
From anus to the end of the tail	3	8
From anus to the umbilicus	2	4
Extreme width of tail	3	8½

* Philosophical Transactions, 1868, p. 201.

	ft.	in.
From termination (apex) of dorsal spinous ridge to the apex of each lateral half of tail	1	11½
Depth of fissure in tail	0	1½
Extreme breadth of tail	1	0½
Width of dorsal fin at its base	0	8
Extreme length of dorsal fin	0	11
Height of dorsal fin from apex to posterior basal ridge	0	6
Girth of trunk opposite the bases of the flippers (underneath flippers)	6	8
Girth in front of dorsal fin	5	0
Girth 1 foot from base of tail	2	8
Girth 2 feet in front of dorsal fin, *i. e.* about midway between dorsal fin and flipper	5	11
Length of baleen, measured along its outer side (from base to point of termination in median line in front)	2	7½
Greatest width of baleen	0	3½
Least width of baleen	0	1½
Number of plates in each lateral half of baleen 330; total 660.		
A line drawn transversely across between the anterior angles of the eyes crosses the summit of forehead 2½ inches from posterior extremity of median nasal groove.		
Distance from posterior extremity of blow-hole to this transverse line	0	3½
Width from eye to eye	2	2

The groove between the blow-holes measured 7 inches, projecting an inch in both the anterior and posterior directions beyond the blow-holes. In the specimen described by Carte and Macalister the nasal groove commenced an inch in front of the anterior commissures of the blow-holes, and fell short of their posterior commissures by about the same distance. The posterior extremity of each blow-hole was wider than the rest of the groove, and the marginal commissures in this situation were marked by rugæ or folds. No hairs were discernible on the nasal commissures. There were, however, two small hairs on the integument covering the apex of the lower maxilla, which could be distinctly seen. The auditory apertures could not be found.

The palpebral fissure extended for a considerable distance both forwards and backwards beyond the ocular aperture, the anterior portion extending a little more than 2 inches, the posterior a little less than 1 beyond it.

The lower jaw projected 1¾ inch more forward than the upper on snout.

The integument covering the whole of the dorsal surface of the animal was of a dusky black, whilst that of the ventral surface was white intermingled with pink, the latter approaching here and there to an almost red colour. This was probably due to exposure to the air. This difference in colour of the integuments on the two surfaces of the body gave a remarkably beautiful appearance to the

animal, which was still further increased by the ribbed arrangement of the skin on the anterior half of the ventral aspect. This ribbed arrangement was produced by numerous longitudinal furrows or sulci, which penetrated fully a quarter of an inch in depth into the skin, and ran in a more or less regularly parallel manner from before backwards, thus dividing the integument into striæ. These striæ were limited laterally by a line drawn from the angle of reflection of the jaws to the base of the flippers, in which situation they were short and somewhat arched. The striæ commenced in front at the lower jaw, extending its whole length. They were wider both at their commencement and at their termination than in the rest of their course. The median striæ were smaller than the lateral, and more uniform in width throughout their entire length, measuring about half an inch, and sometimes a little more or less; whereas the lateral striæ at origin and termination measured from 1¼ to 1½ inch. Posteriorly they terminated in a radiate manner, those in the middle line of the ventral surface being the longest, the remainder gradually shortening as they approached the lateral aspect of the trunk. The sulci or grooves in the median line presented some difference from those more laterally situated. Thus the former terminated more gradually than the latter, and resembled a cut made into the skin by an inexperienced operator; the lateral sulci terminated sharp and abruptly. These plicæ or folds did not decussate, or decrease in number in their transit from before backwards, as mentioned in Carte and Macalister's specimen; they were continuous and well marked throughout. The sulci were wedge-shaped, and not quadrilateral as shown diagrammatically by Hunter; no doubt, if the integument were considerably distended they would present that appearance.

The flipper was traversed about the middle of its entire circumference by a zone of white, which contrasted strongly with the slaty black which extended along its basal extremity for about eight inches, and for the same distance along its distal end. This white zone at the basal end was limited by a sharp and abrupt line of termination directed obliquely from before backwards. Distally it terminated in a radiate manner, the white becoming gradually lost in the black.

The ventral surface of the tail was likewise covered with white integument, except at the margins, where the white and black gradually merged into each other.

The Cranio-mandibular Articulation.—This articulation presented several remarkable and interesting features. It was effected by means of a huge fibro-elastic mass, spheroidal in shape and closely adherent by both of its extremities to the squamosal posteriorly, and the condyle of the mandible anteriorly. A small portion, however, of the concavity of the squamosal was free, the cartilage being unattached, as ascertained by making an artificial opening; the finger could be readily passed for a short distance underneath. There was not the slightest trace of a synovial membrane even here; and the close adherence of the elastic mass to the rest of the squamosal, on the one hand, and the globular head of the mandibular arch on

the other, altogether precluded the possibility of such a membrane existing in these situations. The object of the laxity of the fibro-cartilage at the squamosal concavity was evidently to allow of the passage of a strong ligamentous band from the under surface of the cartilage to the depression in the squamosal, also to allow of the transmission of vessels.

On the inner side the elastic fibro-cartilage projected beyond the squamosal, and was firmly attached to a strong zone or belt, of a more dense fibro-cartilaginous material, which surrounded the tympanic bone, affording to them an efficient retentive as well as protective nidus. On removing the articular mass, the tympanic zone could be well seen; it was broader on the inner than on the outer side of the ossicle, and broader behind than in front. In the former situation it measured $2\frac{1}{4}$ inches from before backwards; in the latter 2 inches, whilst its width on the inner side was only one inch. In the centre of this nidus the oval under surface of the tympanic bone could be seen to the extent of two and a quarter inches, measured in its long axis, and one inch and three-quarters measured transversely.

The superficial or circumferential fibres of the articular cartilage at the maxillary end were prolonged forwards on to the circumference of the mandibular condyle, forming a capsular-like belt of attachment, thereby materially adding to the fixity of the cartilage. The fibro-elastic cartilage was still further protected by a dense ligamentous band which passed, from the squamosal to the maxillary condyle, along its under surface. Surrounding it was a dense mass of connective tissue, in which ramified an intricate plexiform network of vessels and nerves. Imbedded in this connective tissue, on the inner side, was a small wedge-shaped muscle, about $3\frac{1}{2}$ inches long, arising tendinous from the osseous ridge leading from the condyle to the inferior dental foramen. It was about half an inch wide, and terminated in a fascial expansion which was inserted into the fibro-cartilage upon its upper and inner side. The action of this muscle seems to have been to draw the articular mass forwards and inwards, thereby limiting the outward tendency it would otherwise have when the lower jaw was approximated to the upper, and also concentrating the cartilage in the axial line of the mandible during that movement.

The cartilage weighed, when removed, $2\frac{1}{4}$ lbs. Its circumference measured $17\frac{1}{2}$ inches. Its maxillary extremity measured transversely 4 inches, and $2\frac{3}{4}$ inches from above downwards. Its squamosal end measured 5 inches laterally, and $4\frac{1}{2}$ from above downwards. It presented the well-marked shape of the squamosal articular surface, namely concavo-convex, the concavity being situated antero-internally, the convexity postero-externally. Its length was $4\frac{1}{2}$ inches.

This articulation is a true amphiarthrosis, exactly analogous to that between the vertebral segments of the human subject, minus the pulp.

The muscles of mastication were moderately well developed, being short, thick, and strong, and so closely approximated to the articular

cartilage as to afford a still further protective shield to it. These muscles presented no difference from the very accurate description given of them by Carte and Macalister, except that the internal pterygoid was present, arising posterior and internal to the external pterygoid, and inserted anterior and internal to it, thus closely imitating the disposition of the corresponding muscle in the human subject. It was thin and small comparatively to the external pterygoid.

The Pelvic Bones.—These were two in number, both in a cartilaginous condition, situated immediately above and on each side of the anal aperture, the inner extremity of the base of each being distant only an inch and three-quarters from it; they were asymmetrical, the right being a quarter of an inch longer than the left, owing to its anterior extremity being more pointed and prolonged a little more forwards. Both presented two flattened surfaces, two borders (an internal, concave, and an external, convex at its upper and concave at its lower part), and two extremities (an anterior pointed, and a posterior broad and directed obliquely from without downwards and inwards towards the anal aperture). At the summit of the outer convexity there was a small rough fibrous mass, about the size of a pea, in which were imbedded a number of very small cartilaginous plates. This is evidently the rudimentary representative of the femur. It is an easy matter to overlook this little mass, if attention is not particularly directed to it.

Both of these cartilaginous pelvic bones were enveloped in a dense fibrous capsule, which, stripped off, exhibited about the middle a prominent pinkish-red spot, studded over with minute puncta vasculosa. In the left one only was there a decided centre of ossification. The right was entirely cartilaginous.

Both of these rudimentary pelvic bones were imbedded in a mass of muscular tissue, so that care was required to detect them.

The heart and great vessels, except that the former was more median in position and flattened, presented a similar disposition to those of the human subject. The weight of the heart was about 100 oz. The walls of the left ventricle were an inch and a quarter thick, whilst those of the right ventricle were only about half an inch. In the right ventricle there was a very prominent fleshy column, situated on its inner wall, and about half an inch thick. It traversed the long axis of the ventricular cavity. From the middle of this column a second or transverse one arose, which crossed the middle of the cavity to the right wall, where it divided into a number of smaller columns, continuous with those on the posterior wall. The pulmonary artery was very large; its diameter measured $3\frac{1}{4}$ inches in the interior, readily admitting a circular disk of this size without any distention. Its walls, however, were very thin in comparison with those of the aorta.

The pulmonary semilunar valves were large. The right one had a small nodule of Arantius, the rest being destitute of it.

The aorta, at its origin from the left ventricle, was two inches in diameter. As it approached the part from which the innominate

artery was given off, it underwent some increase in size, and became diminished again below the origin of the left subclavian.

The diameter of the interior of the artery measured only an inch and a quarter, the remaining three quarters of an inch being occupied by the walls.

The inferior wall of the aortic arch presented a remarkable increase in thickness from that of the rest of the tube, at the point opposite the orifice of the innominate artery, being fully half an inch in thickness. The thickness is obviously to prevent yielding at this part, which otherwise would be a weak point, and liable to aneurismal dilatation from the constant shocks which would be communicated to it by the pressure from the recoil of blood from the right aortic wall.

The posterior wall of the arch of the aorta was traversed by numerous irregularly longitudinal striæ, which extend as far as the origin of the left common carotid artery. From these striæ it can be easily inferred that the aorta is subjected to considerable dilatation at each ventricular systole.

The Lungs.—The left lung measured, in its long axis, 23 inches, the right 21 inches. The left lung weighed 6½ lbs, the right 5 lbs. Both lungs were very much congested, especially the left one. Neither presented any lobular divisions.

The trachea was remarkably short, but very wide and flattened. It gave off a small additional bronchus on the right side, to the the upper part of the right lung.

Alimentary Canal.—The stomach consisted of four irregular cavities. The outward configuration of each varied considerably, especially of the first and second. The former presented a fusiform shape, being much wider at the centre than at its apex and œsophageal extremities. It measured, when moderately distended with water, 22 inches in its long diameter, and 11 inches transversely at its widest part. The œsophagus entered the upper part of its dorsal aspect, the upper end projecting upwards beyond the point of junction of the gullet, and formed a continuous fence or band with the second stomach. Below it tapered to a blunted point.

The second stomach was cylindrical in shape, being directly continuous at its anterior part with the first stomach, the two being united at an acute angle, and forming a V-shaped figure, the apex being directed upwards towards the diaphragm, and then the two diverging away from each other, the latter, or second stomach, projecting somewhat beyond the first, and presenting a more regular calibre throughout its entire length, terminating, however, below in a blunted and somewhat rounded point. It measured in its long diameter, from the angle of junction between it and the first stomach, 17 inches.

The third stomach was smaller than either of the preceding, and directed more obliquely. It was attached to the middle of the right side of the second stomach, and presented an elliptical shape. It measured 13 inches in its long diameter. It was connected with the second stomach by a strong band of fascia, which passes between the adjacent sides of the second and third stomachs.

The fourth stomach was directed more horizontally than the pre-

ceding, and was of a rounded or globular shape. It measured 6 inches in its long diameter, or somewhat less than half the diameter of the third stomach. It had, arising from the middle of its dorsal aspect, in an infundibuliform manner, the duodenum, or commencement of the small intestines.

The girth of the first stomach at its middle or widest part measured 30 inches, that of the second 22 inches, the third 21 inches, and the fourth 18½ inches.

On opening the stomachs there was found in the first ten small pebbles, and in the second also ten others. All the stomachs were perfectly empty in other respects.

The mucous membrane presented different characters in each of the four stomachs. In the first it was of a pearly pinkish-white hue, complexly convoluted, the convolutions being continuous from the longitudinal rugæ of the œsophagus. In the second stomach the colour of the mucous membrane was pale brown, the rugæ running in a transverse direction, and in the upper and lateral walls presenting large and small alternations, the large ones projecting very prominently in the interior of the cavity. At the distal end the rugæ were almost absent.

In the third and fourth stomachs the mucous membrane was of a pale creamy-yellow colour; the rugæ scanty and irregular

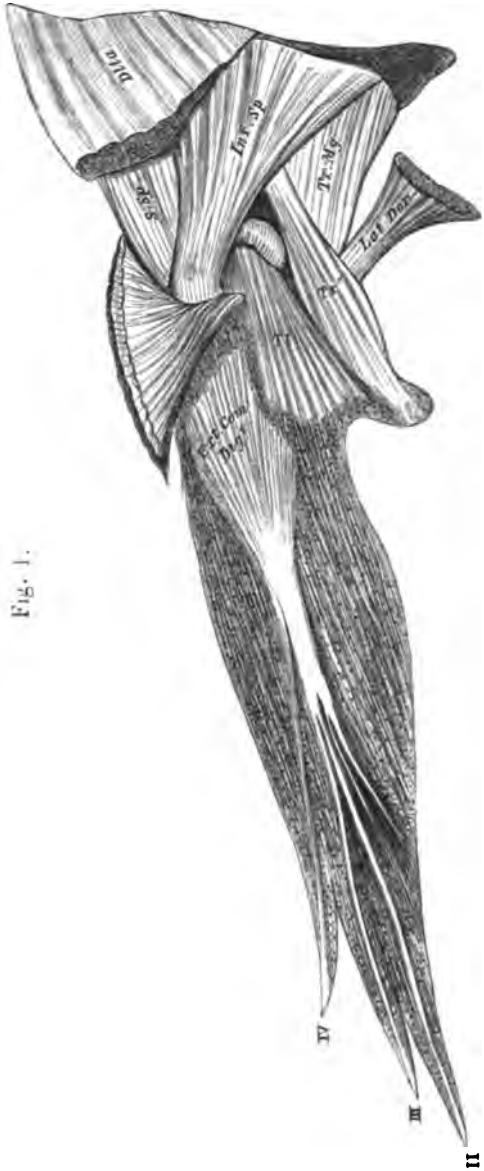
The aperture between the first and second stomachs is very large, and readily allows of the passage of materials from one to the other. The aperture between the second and third stomachs is circular, and guarded by an annular, prominent valve. The diameter of this opening is about two inches, the canal afterwards becoming convoluted, and, at its entrance into the third stomach, again undergoes dilatation. The latter aperture is also guarded by an annular valvular fold. The length of this canal is about 2½ inches long. The aperture between the third and fourth stomachs is small and semilunar, and directed transversely. The fourth stomach passes directly into the intestine, the only lines of demarcation between the two being the abrupt termination of the large calibre and the presence of valvulæ conniventes.

The intestines measured 72 feet 2 inches from the commencement of the duodenum to the cloaca. The large intestine occupied only 5 feet 4 inches of the length. From the commencement of the duodenum to the first diverticulum, a little sac-like dilatation of the small intestine, measured 43 feet 5 inches.

Kidneys:—Weight=2 lbs. 1 oz.; length 15 inches; width across, or transverse measurement, =5 inches; shape fusiform. Surface mapped out into comparatively regularly polygonal-shaped spaces, giving to the kidney a beautiful lobulated character. The diameter of the lobules varied from ¼ to an inch. The lobules could be readily isolated, being connected together by a very thin, delicate areolar tissue. The liver was similar in every essential particular to that of Carte and Macalister's specimen.

Muscles of the Shoulder and Extremity.—These presented some few differences from those described by Carte and Macalister.

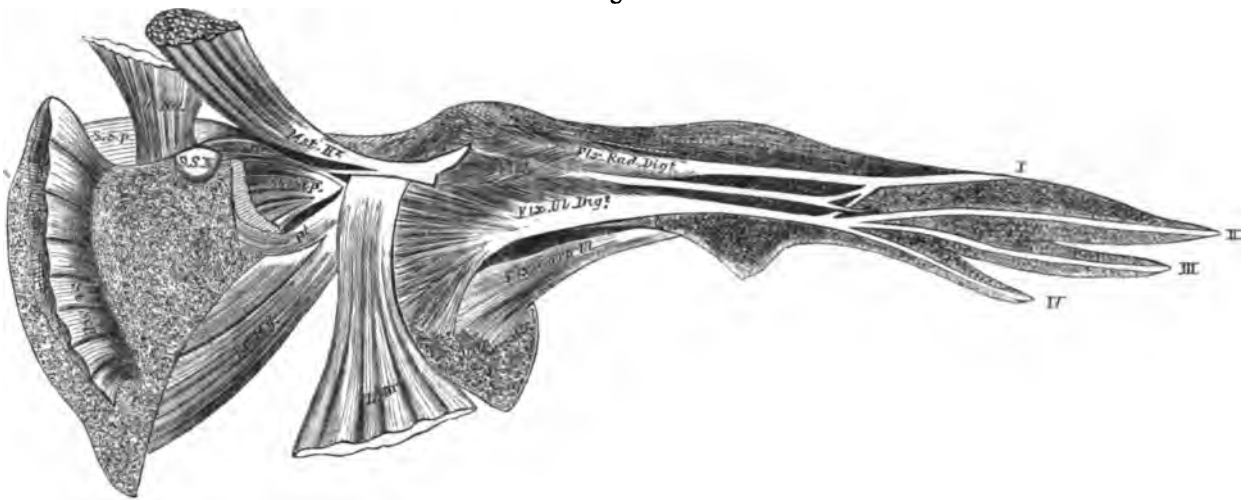
Fig. 1.



Muscles of the dorsal surface of the fore limb of *Balænoptera rostrata*.

Dlta. Deltoid cut through. *S. Sp.* Supraspinatus. *Inf. Sp.* Infraspinatus. *Tr. Mj.* Teres major. *Lat. Dor.* Latissimus dorsi. *Tr*, *Tr'*. External and long heads of the triceps. *Ext. Com. Digt.* Extensor communis digitorum.

Fig. 2.



Muscles of the palmar surface of the fore limb of *Balænoptera rostrata*.

Sb. Scp. Subscapularis. *O. Hd.* Omo-hyoid. *S. S. N.* Suprascapular notch. *S. Sp.* Supraspinatus. *C. B.* Coraco-brachialis. *Sb. Scp.* Subscapularis, and *Pt.* Accessory aponeurotic attachment. *Tr. Mg.* Teres major. *Lt. Dr.* Latissimus dorsi. *Flx. Rad. Digt.* and *Flx. Ul. Digt.* Radial and ulnar portions of the flexor profundus digitorum. *Flx. Carp. Ul.* Flexor carpi ulnaris. *Fl. I.* Flexor sublimis digitorum. I, II, III, IV. Index, middle, annular, and little digits, respectively.

The teres major was not inseparably connected at its origin with the serratus magnus, but arose independently of it. It extended almost the whole length of the postaxial border of the scapula. The muscle, prior to its insertion, was joined along its upper border by a fascial process from the capsular ligament (ventral surface) (fig. 2, *Pt*).

The teres minor was absent.

The subscapularis (fig. 2, *Sb. Scp.*) presented more of the character of the muscle (described by Carte and Macalister) of the *Globiocephalus svineval*. It was very large, occupying the whole of the subscapular fossa. Its surface was traversed by seven tendinous intersections, which divided the muscle into eight nearly equal-sized fleshy slips. Its tendon of insertion was broad and moderately thick; its deeper portion was inserted into the neck of the ventral surface of the humerus, immediately below the head of that bone. Its superficial fibres were prolonged across the ventral surface of the humerus, forming a dense investment to it, on to the bones of the forearm, along which it was further continued, previously acting as the anterior connecting ligament, along with other tendinous expansions (viz. those of the pectoral and masto-humeral, which it joined), to the humero-cubital articulation.

The *coraco-brachialis* (fig. 2, *C. B.*).—This muscle presented no differences in origin from that described by Carte and Macalister. But its insertion differed materially from that found by them, both in the *Balænoptera* and *Globiocephalus*. Its tendon of insertion, opposite the upper border of the distal attachment of the latissimus dorsi and teres major, divided into two tendons. The anterior tendon passed along the ventral aspect of the insertion of the latissimus as far as its lower border, where it terminated, being partly inserted into the humerus and partly joining the tendinous expansion of the masto-humeral. The posterior tendon passed behind the insertions of the latissimus dorsi and teres major, giving off a slip of attachment to the humerus immediately behind the upper part of the insertion of the latter muscle; the remainder of the tendon was prolonged downwards and backwards, spreading gradually out into an expansion three quarters of an inch wide, which joined the external head of the triceps to be inserted along with that muscle. The distal division of this muscle may be regarded as a tendency towards the formation of a second coraco-brachialis, as occasionally found in the human subject; and its passing behind the latissimus favours this view materially.

Extensor communis digitorum (fig. 1, *Ext. Com. Digt.*) arose, by a strong flat tendon, from the dorsal surface of the distal extremity of the humerus, immediately above the articulation. It passed down in the interval between the radius and ulna, lying in the interosseous space, in which situation it received additional fibres of attachment. It was crossed on its dorsal aspect by a strong fibrous band, and by its ventral aspect lay in contact with an imperfect interosseous membrane, thus being situated, as it were, in a membranous or aponeurotic tunnel. About three inches above the lower end of the radius

it gave off a tendon to the index digit. From this tendon an additional one was given off to the dorsal carpal fascia and the base of the middle metacarpal bone. Besides these it gave off three other tendons respectively to the second, third, and fourth digits.

This muscle presented a few differences from the corresponding one described by Carte and Macalister, namely:—

1. It attained a humeral attachment, whereas Macalister's specimen had only a radio-ulnar attachment.

2. Its indicator tendon gave off an additional slip to the metacarpus.

3. It was well developed, Macalister's specimen being a mere rudimentary fasciculus.

The flexor muscles are three in number—namely, flexor carpi ulnaris, flexor sublimis digitorum, and flexor profundus digitorum.

The *flexor carpi ulnaris* (fig. 2, *Flx. Carp. Ul.*) arose from the olecranon, its ventral aspect, and was inserted into the ventral border of the lower end of the ulna.

The *flexor sublimis digitorum* (fig. 2, *Fl. I.*) was a small and bipenniform muscle, occupying the interval between the ulnar and radial divisions of the profundus flexor. It arose from the distal end of the humerus, immediately below the insertion of the latissimus dorsi, and behind the aponeurosis from the masto-humeral. Its muscular fibres soon terminated in a long slender tendon, which passed downwards in the interval between those of the deep flexor tendons. Opposite the lower end of the radius it divided into two tendons: the radial tendon was short, and joined a corresponding tendon from the ulnar portion of the deep flexor; the ulnar tendon was also short, and terminated in the palmar carpal fascia. Between the divisions the radial tendon of the ulnar portion of the deep flexor passed, forming a rudimentary condition of perforatus and perforans.

The *flexor profundus digitorum* (fig. 2, *Flx. Rad. Digt.*, *Flx. Ul. Digt.*) consisted of two distinct portions, separated by the flexor sublimis. The ulnar portion was fan-shaped, arising by fleshy fibres from the anterior surface of the distal end of the humerus, from the adjoining surface of the ulna and its olecranon, from the upper part of the shaft of the ulna and the strong fascia which covered it. It terminates in a strong flat tendon, fully half an inch wide, about the middle of the shaft of the ulna, and opposite the lower end of that bone divided into four tendons. The radial one passed through the two divisions of the flexor sublimis, joining the radial one, already described, to be inserted into the radial tendon of the deep flexor. The three remaining tendons were prolonged to the distal extremities of the phalanges of the second, third, and fourth digits respectively, imbedded in aponeurotic canals. The radial portion of the deep flexor was much smaller than the preceding: it arose from the upper two-thirds of the anterior surface of the shaft of the radius, and from the membrane occupying the interosseous groove. Its fleshy fibres terminated in a strong tendon, which was joined opposite the carpus by the conjoined tendon formed by the radial divisions of the sublimis and ulnar portion of the deep flexor tendons. The resulting tendon was finally inserted into the distal extremity of the first digit.

This arrangement differs somewhat from that described by Carte and Macalister.

There was no palmaris longus.

The suprascapular ligament is triangular in shape, 2½ inches long, and attached by its base to the upper border of the scapula, reaching as far outwards as the coracoid process. The omo-hyoid muscle is attached to the whole length of this ligament.

The suprascapular notch was oval in shape, the long axis of the ellipse running parallel with the supraspinatus muscle, measuring 2 inches; its vertical axis measured 1½ inch. It transmitted the large suprascapular nerve, and was closed in posteriorly by the supraspinatus muscle.

The Scapulo-humeral Articulation.—This articulation is a perfect enarthrosis, provided with a complete capsular ligament, stronger on the ventral than the dorsal aspect of the joint. It is not perforated by the tendon of the subscapularis muscle, as described by Carte and Macalister in their specimen. Although the tendon of the subscapularis lies in close contact with it, it could be readily detached by careful dissection, without any appearance whatever of perforation.

The capsular ligament was strengthened on its dorsal aspect by a strong ligamentous band, which was attached proximally by a broad expansion to the margin of the glenoid and the adjoining surface of the base of the coracoid; from this wide attachment the ligament rapidly narrowed to a strong and thicker band, about one quarter of an inch wide, which passed across the capsular ligament to be inserted into the humerus immediately to the ulnar side of the infraspinatus tendon, and behind the tendon of insertion of the deltoid. This articulation has a large and somewhat loose synovial membrane, which could be readily demonstrated by dissection.

From the ventral aspect of the capsular ligament a strong tendinous process, about an inch and a quarter wide, arose, passing behind the subscapular muscle, and joined the upper fibres of insertion of the teres major muscle (fig. 2, *Pt*). No distinct muscular fibres could be detected in this fascial process, though it is evidently homologous to a peculiar muscle which is occasionally found in the human subject.

The humero-cubital articulation is formed by the direct apposition of the slightly convex and transversely flattened distal extremity of the humerus with the flattened and but slightly concave proximal ends of the radius and ulna, the latter bone having on its postaxial border its cartilaginous olecranon prolonged backwards on to the humerus somewhat beyond the remainder of the bone. There was but very slight movement in this articulation, the greatest extent being allowed at the point of the recurvation of the olecranon, and the direction of the movement from before backwards. There is a distinct synovial membrane, though extremely thin, but capable of demonstration, especially at the postaxial side of the joint, where the greatest movement was found. There seem to be no distinct and separate ligaments, the place of the latter being supplied by the



J. Smit. lith.

M & N. Hanhart imp

LOBIOSPIZA NOTABILIS.

fibrous expansions from the humeral muscles, more especially the great pectoral, masto-humeral, the subscapularis, the infraspinatus, and deltoid.

2. On *Lobiospiza notabilis*, a remarkable new Finch from the Navigator's Islands. By Dr. G. HARTLAUB, F.M.Z.S., and Dr. O. FINSCH, C.M.Z.S.

(Plate XLIX.)

In a collection of birds sent for determination from the private museum of Messrs. Johann and Cesar Godefroy of Hamburg, we received a little Finch, which proves to be new to science. The single specimen was collected by the well-known explorer of the Central Pacific Islands, Dr. Eduard Gräffe, in the island of Upolu.

We congratulate the indefatigable traveller upon this discovery, it being the more important and interesting inasmuch as, until now, among the extensive series of Fringilline birds no member has been found having the gape ornamented with wattles. The "Wattled Finch," therefore, merits, in our opinion, to rank as the type of a new genus, which we propose to call

LOBIOSPIZA, gen. nov.

Char. gen.—*Rostrum robustum, integrum, rotundatum, basi dilatato-incrassatum, culmine rotundato; naribus occultis; rictu caruncu-lato, caruncula rotundata, verrucis duabus obsita.*

Alæ longiusculæ, remigibus tertio et quarto æquilongis; primo brevissimo (3‴)

Cauda brevior, mollis, attenuata; rectricibus augustatis, debilibus, apicibus subacuminatis.

Pedes majusculi, graciles; tarso caligato; digito interno et externo æquilongis; unguibus acutis, compressis, valde arcuatis.

The most striking feature in this singular genus is, as already mentioned, the presence of wattles. These are composed by the margins of the angle of the mouth, which are swollen and prominent, forming a rounded leaf-like small caruncle, which is besides ornamented with two small prominent granule-like verrucæ. These caruncles resemble those of *Heteralocha*; but in the latter they are considerably further extended, and smooth. The remaining generic characters agree with those of the nearest ally, *Amblyura*, Reichb., except in having the bill proportionally stouter and more fornicated.

LOBIOSPIZA NOTABILIS, sp. nov. (Plate XLIX.)

Diagn.—*Tota obscure et obsolete cærulescens, plumis basin versus nigricantibus: subtus pallidior; remigibus et rectricibus nigris, cærulescente marginatis; caudæ tectricibus superioribus fusce-scentibus; plumulis supranasalibus conspicue nigricantibus; rostro flavido, apice nigricante; pedibus infuscatis.*

Uniform dull blue, in a certain light with a faint shadow of greenish blue; the base of the feathers blackish, giving a somewhat mottled appearance, especially on the head; lores blackish; underparts somewhat lighter blue than the back; the feathers on the vent with very indistinct whitish bars; remiges brownish black; primaries with narrow, secondaries with broad margins of dull blue along the outer webs; under wing-coverts pale isabelline; upper tail-coverts dirty brownish; tail-feathers blackish brown, narrowly margined externally with greyish brown.

Bill hornish yellow tipped with blackish; on the gape a naked oval caruncle, also yellow, with two blue verrucæ; legs and feet pale brownish.

Long. tot.	long. al.	caud.	rostr. a fr.	rictus.	alt. rost. a bas.	tars.	dig. med.	ung.
$3\frac{1}{2}''$	2″ 3‴	12‴	5‴	5‴	$3\frac{3}{4}'''$	8‴	$5\frac{1}{2}'''$	$2\frac{1}{4}'''$

The unique specimen described above was preserved in spirits, and is evidently a young bird. The coloration of the old bird may very probably differ a good deal, as is the case between old and young specimens of both species of *Amblyura*. Analogously to the latter, it might be suspected that the dirty brownish tinge on the upper tail-coverts would change to red.

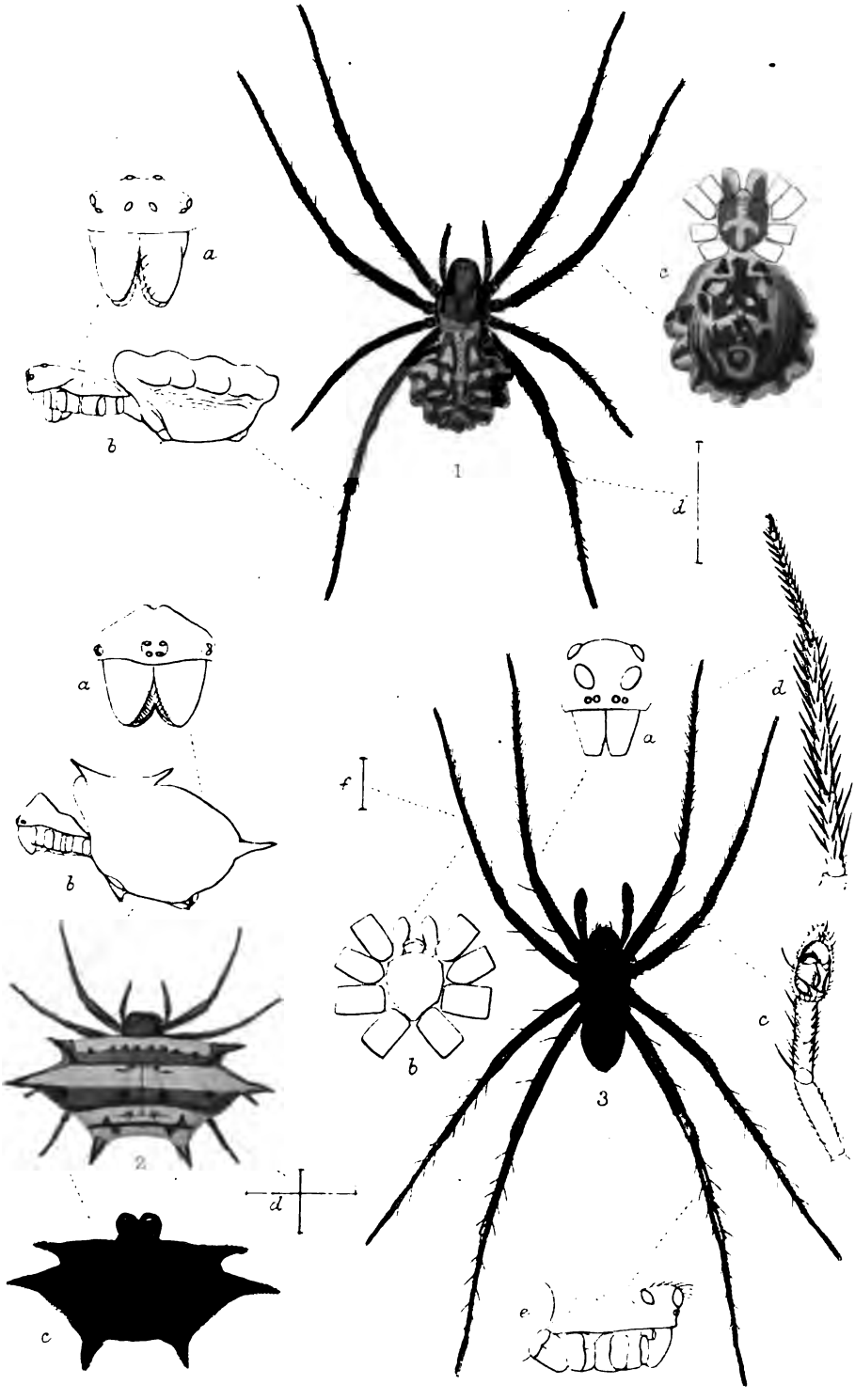
Unfortunately no notice is given of the habits, or the colours of the naked parts alive. The stomach contained small seeds and grains.

3. Notes on a Collection of *Arachnida* made by J. K. Lord, Esq., in the Peninsula of Sinai and on the African borders of the Red Sea. By the Rev. O. P. Cambridge, M.A., C.M.Z.S.

(Plate L.)

The above collection contained two species of Scorpionidea (upon the specific identity of which I am unable at present to offer any reliable opinion), two species of Solpugidea, and nineteen species of Araneidea. The Scorpions belong, I believe, to the genera *Telegonus* and *Androctonus* (Koch); the Solpugidea were the *Solpuga araneoides* (Oliv.) and the *Solpuga melana* (Savign.) (*Rhax melana*, Koch). Of the former there were several examples, captured in the Wady Ferran, peninsula of Sinai; it is an abundant species in Upper Egypt, as well as in the plains of the Jordan, lurking by day under the stones and among the débris of old ruins, and at night running abroad with great activity and swiftness: of the latter species (*S. melana*) there was but one example, captured also in the Wady Ferran; its dark colour and short legs serve to distinguish it readily from the former. Both are described and figured by Savigny in his great work (Egypte, Arachnides, pl. 8. figs. 7–9).

The following is a list of the Araneidea, which comprised three


a
b
1
c
d
a
b
f
2
d
c
a
d
b
3
c
e

species apparently new to science, and of which descriptions and figures are added below.

1. *Segestria perfida*, Walck. Ins. Apt. i. 267.— Wady Gherandel, pen. Sin.

2. *Drassus listeri*, Savign. Egypte, Arachn. p. 155, pl. 5. fig. 4.— Convent gardens and back of Mount Sinai.

3. *Pholcus rivulatus*, Savign. Egypte, Arachn. pl. 3. fig. 12.— Convent gardens and back of Mount Sinai.

4. *Latrodectus hamatus*, Koch, Die Arachn. vi. tab. ccvi. figs. 507, 508.—Convent gardens and back of Mount Sinai.

5. *Argiope aurelia*, Savign. Egypte, Arachn. pl. 2. fig. 5.— Inland from Massowah.

6. *Argiope lordii*, Cambr., n. sp.—Inland from Massowah.

7. *Argiope sericea*, Savign. Egypte, Arachn. pl. 2. fig. 6.— Convent gardens and back of Mount Sinai.

8. *Epeïra opuntiæ*, Dufour; Walck. Ins. Apt. ii. p. 140.— Inland from Massowah.

9. *Epeïra solers*, var. ?, Walck. Ins. Apt. ii. p. 41.—Jebel Musa, pen. Sin.

I am not satisfied about the specific identity of this Spider; it is similar to several examples captured by myself in Egypt and in Palestine; and when the adult male is discovered, possibly it may prove to be undescribed; at present, only having seen the female (in which no structural difference is observable, though it differs somewhat in colours and integument), I include it as a variety of *E. solers*.

10. *Gasteracantha lepida*, Cambr. n. sp.— Mangrove-swamps; African border of Red Sea.

11. *Sparassus linnæi*, Savign. Egypte, Arachn. p. 160, pl. 6. fig. 2. —Hot springs, Pharaoh's Baths, Cairo.

Mr. Lord assures me that he captured this species (of which several examples were contained in his collection) in the water of the above baths, into which they voluntarily plunged. Independently of the high temperature (157° Fahr.) of these waters making this a remarkable fact, it is the first species of this family of Araneidea (*Thomisides*) in regard to which, as far as my knowledge goes, aquatic habits have been observed.

12. *Sphasus alexandrinus*, Savign. Egypte, Arachn. p. 142, pl. 4. fig. 1.—Jebel Musa, pen. Sin.

13. *Pasithea viridis*, Blackw. Ann. & Mag. Nat. Hist. 3rd ser. vol. i. no. 6, p. 427.—Jebel Musa, pen. Sin.

14. *Lycosa pilipes*, Lucas, Explor. en Algérie, *Arachnides*, p. 109, pl. 2. fig. 8.—Wady Gherandel, pen. Sin., Nasb, Genneh, Jebel Musa, and at Pharaoh's Baths, Cairo.

15. *Lycosa prælongipes*, Cambr., n. sp.—Wady Nasb, Genneh, Jebel Musa, pen. Sin.

16. *Lycosa tarentula apuliæ*, Walck. Ins. Apt. tom. i. p. 281.—In an old wall, Wady Ferran, pen. Sin.

17. *Salticus vaillantii*, Lucas, Explor. en Algérie, *Arachnides*, p. 136, pl. 5. fig. 2.—In an old wall, Wady Ferran, pen. Sin.

18. *Attus sanguinolentus*, Walck. Ins. Apt. tom. i. p. 473.—Convent gardens and back of Mount Sinai.

19. *Eresus acanthophilus*, Duf.; Walck. Ins. Apt. tom. i. p. 399.—Wady Nasb, Genneh, Jebel Musa, and Convent gardens, back of Mount Sinai.

Descriptions of new Species.

Genus Argiope (Savign.).

Argiope lordii, n. sp. (Plate L. fig. 1.)

Female adult, length 8½ lines.

Cephalothorax flattened, oblong oval, strongly compressed laterally at the caput, which is rather produced; the normal furrows and indentations are well marked; the colour is deep brown, with a broad yellow thoracic margin, and reddish-yellow patches or suffusions at the junction of the caput and thorax; the brown portions are thickly clothed with a short adpressed light grey pubescence, among which are some short erect dark bristles.

Eyes eight, not very unequal in size, in four pairs near the extreme upper fore margin of the caput; those of the two central pairs form an oblong figure, the eyes of the fore side being the largest of the eight, and slightly nearer together than those of the hinder side, though, owing to their larger size, they form a line of equal length; the eyes of each lateral pair are contiguous, placed obliquely on a small tubercle, and are more nearly in a straight line with the eyes of the *fore* than of the hind central pair.

Legs long and strong, of a deep red or chestnut-brown colour, with bands of short light grey hairs, furnished, not very thickly, with hairs, bristles, and small spines; each tarsus ends with three claws, the two superior ones strongly pectinated; and beneath them are some supernumerary opposed ones.

Palpi yellowish, clouded and striped with red-brown, furnished with hairs, coarse bristles, and fine spines; and each ends with a curved pectinated claw.

Falces moderately long, strong, vertical, conical; of a deep brown colour, slightly tipped with yellow.

Maxillæ short, strong, enlarged near their middle, round at the extremities; of a rich black-brown colour, broadly terminating at the upper extremities with yellow.

Labium short, broad, and subtriangular; it is of a black-brown colour at the base; and the apex, which is blunt in form, is yellow.

Sternum heart-shaped, slightly indented on its edges; it is of a deep brown colour charged with a large and somewhat cruciform yellow marking; and the whole is thinly clothed with fine grey hairs.

Abdomen large, of an oblong-oval form, flattened but irregular on

its upper surface, and projecting over the base of the cephalothorax; its fore margin is truncate; the rest is considerably indented, forming strong lobes all round, especially towards the hinder part, which is somewhat transversely rugulose; its colour on the upperside is yellow, strongly marked with a complex zigzag or dentated pattern of a deep brown, which it is impossible to describe accurately and intelligibly, though easily seen in the figure. The yellow portions are more or less clothed with a silky white pubescence; the lateral lobes are yellow, and each is divided by a broad deep-brown band which runs over them from the upper- to the underside; the fore part of the abdomen is rather thickly furnished with short erect dark spiny bristles; the sides are yellow, striated with deep brown; and the underside is deep black-brown with yellow blotches and markings; the spiracular plates are of a reddish-brown colour, margined before and inside with yellow.

An adult female of this fine species, which I believe to be undescribed, was captured by Mr. Lord inland from Massowah; and I have great pleasure in naming it after its captor, by whose kindness I am able to describe and figure it.

N.B.—In describing the pattern on the abdomen of this (and other intricately marked) species, the *dark* colour might be taken as the *ground*-colour; but I have above assumed the *lighter* colour to be so.

Genus GASTERACANTHA.

GASTERACANTHA LEPIDA, n. sp. (Plate L. fig. 2.)

Female adult: length of abdomen 3 lines, breadth 5½ exclusive of the spines; length of the Spider 4½ lines, breadth to extremity of the lateral spines 8 lines.

The *cephalothorax* is similar in general form and appearance to that of many other allied species; the caput is elevated, the occiput being the highest part, and its high transverse ridge is divided across the middle by a notch or groove into two quasi-segments; its colour is a deep rich chestnut-brown; the *falces* are rather deeper in colour, and the *legs* (which are moderately strong, not very long, and furnished with hairs and slender bristles) are of a rich deep brown colour; the palpi are similar in colour.

The *maxillæ*, *labium*, and *sternum* are normal in structure and of a jet-black colour: the *eyes* also are normal in position; four form a small trapezoid, of which the fore side is the shortest, and are seated on a tubercle near the middle of the lower fore margin of the caput; and on either side is a lateral pair widely removed from the central square; the eyes of these lateral pairs are contiguous to each other, and each pair is seated on a strong lateral tubercular prominence of the fore corner of the caput.

The *abdomen* is of the usual horny texture; its breadth is double its length; and it is armed with six prominent sharp spines of different lengths, none being very long; two spring from the ends of the fore margin, and are directed a little forwards; behind each of these is another (the longest of the six) very slightly curved, and whose direction is in the least possible degree backwards: the

remaining two issue from the hinder portion of the abdomen; they are about the length and strength of the two foremost, and are rather divergent from each other; all of them have a slight tendency upwards and are furnished rather thinly with bristly hairs: the fore margin, between the two foremost spines, is curved and indented in the middle; parallel with it is a row of the usual ten round impressed punctures, two others are behind each of the intermediate spines, a transverse row of five occupies the hinder margin, and four in a trapezoid, widest behind, occupy the centre; the upperside is of a bright rich orange-yellow, with two broad parallel transverse bands of blood-red tinged with carmine, connecting each of the fore pairs of spines in which they meet, the spines being strongly suffused with deep red-brown; one indistinct narrow transverse bar of cinnabar-red connects the hind marginal row of impressed spots; and the bases of the two hinder spines, with a considerable portion of the immediately surrounding surface, are also of the same blood-red colour. The abdomen might almost be described as alternately barred, on the upperside, with transverse bars of red and yellow; the underside is bright yellow, strongly striated and intersected with black, going off into red near the spines; the spinners are black; and between them and the epigyne is a conical, prominent, corneous-looking, shining prominence which is also of the same colour.

A single example of this species was captured in a geometric web in a mangrove-swamp, inland from Massowah; it is allied closely to *Gasteracantha sanguinolenta* (Koch), but may easily be distinguished by the greater proportional breadth of the abdomen and the greater length of the spines with which it is armed.

Family Lycosides.

Genus Lycosa.

Lycosa prælongipes, n. sp. (Plate L. fig. 3.)

Male adult, length 3¼ lines, length of a leg of the posterior pair nearly 12 lines.

This Spider is almost entirely of a brightish sandy-yellow colour; the *cephalothorax* has two broad longitudinal lateral brown bands having a yellow lateral margin on each side, and a broad central one; the last strongly constricted or indented near the middle at the junction of the caput and thorax, and enlarged at the middle of the thoracic portion, narrowing again at its posterior extremity; the region of the eyes is blackish, and the whole of the cephalothorax is thinly furnished with greyish hairs; the form of the cephalothorax is peculiar, the normal, lateral, oblique indentations which indicate the junction of the caput and thorax being very strong and forming a marked constriction, the thoracic portion being rounded (and, indeed, somewhat gibbous) in consequence, and leaving a dip or hollow between its highest point and the ocular region.

The four hinder *eyes* are unusually large, and form very nearly a square, the two foremost being the largest; the two centrals of the

lower row are larger than the laterals, and each is further from the other than from the lateral on its side; the four form a curved line of less length than that formed by the two large eyes above them, from which they are separated by half a large eye's diameter, and from the lower margin of the clypeus by rather more than that space.

The *legs* are very long, moderately strong, and furnished with hairs, bristles, and long slender spines. Some of the legs were a good deal fractured; but their relative length appeared to be 4, 3, 1, 2; those of the fourth pair greatly exceeded the rest, which did not seem to vary much in their relative length; the femora were marked on the uppersides with stripes and irregular bands of brown.

The *palpi* are short and moderate in strength; they are similar in colour and armature to the legs; the cubital joint is shorter but a little stronger than the radial; the digital joint is not large, it is about equal in length to the radial and cubital together, and it is of a yellow-brown colour; the palpal organs are neither very prominent nor complex, they have a sharp projecting corneous prominence at their outer extremity.

The *maxillæ* are not very long or strong; but they incline towards the *labium*, which is broad, somewhat quadrate, rather narrower at its apex than at its base; its colour is yellow-brown, the apex sandy yellow. The *sternum* is very short, heart-shaped, pointed behind, and hollow on its fore margin.

The *abdomen* is small and of an oval form; in the example described it was much shrunk and shrivelled; but it appeared to have an irregular dark yellow-brown longitudinal band on either side of the median line, leaving a broad central longitudinal strongly dentated yellow band terminating just above the spinners.

An adult male of this Spider was obtained by Mr. Lord in a wady near Jebel Musa, Sinai. The length of the hinder pair of legs, and the constricted form of the cephalothorax, constitute very strong specific characters in this apparently hitherto undescribed species of a now numerous genus.

EXPLANATION OF PLATE L.

Fig. 1. *Argiope lordii*, ♀, p. 820.
- *a*. Fore right view of cephalothorax and falces.
- *b*. Profile, without legs.
- *c*. Underside, without legs.
- *d*. Natural length.

2. *Gasteracantha lepida*, ♀, p. 821.
- *a*. Fore right view of cephalothorax and falces.
- *b*. Profile, without legs.
- *c*. Underside, without legs.
- *d*. Natural size (length and breadth).

3. *Lycosa prælongipes*, ♂, p. 822.
- *a*. Fore right view of cephalothorax and falces.
- *b*. Underside of cephalothorax.
- *c*. Palpus.
- *d*. Tarsal and metatarsal joints of leg of first pair.
- *e*. Profile of cephalothorax, without legs.
- *f*. Natural length.

4. On the Occurrence of *Lates calcarifer* in Australia.

By Dr. A. GÜNTHER, F.Z.S.

Mr. Sclater has received several specimens of a Perch from Mr. E. P. Ramsay, C.M.Z.S., of Dobroyde, Sydney, N.S.W. They were obtained from salt water at the mouth of the Fitzroy River, Queensland. At the first glance, I believed them to be the Australian *Psammoperca waigiensis*; but on a closer inspection I found that they had the lower limb of the præoperculum armed with four strong spines, and that they were of a species of *Lates* not distinguishable from the Indian *Lates calcarifer*. This species is known to inhabit fresh and brackish waters, and probably also enters the sea. The British Museum possesses a series of examples, with perfectly reliable information as regards the localities where they were obtained:—one example from the coast of North-western India (*Playfair*), several from the Ganges (*Hamilton-Buchanan* &c.), one from Amoy (*Swinhoe*), several from China (*Reeves*), one from North China (*Jamrach*). Bleeker records specimens in his collection from Java, Madura, Banka, Borneo, and Celebes. The second Australian species of *Lates* (apparently limited to this continent) is *Lates colonorum*.

The pseudobranchiæ of *Lates calcarifer* are an extremely narrow strip of very short laminæ, and easily overlooked.

5. Description of an Adult Skull of *Eupleres goudoti*.

By Dr. J. E. GRAY, F.R.S. &c.

(Plate LI.)

Flacourt, in his book on Madagascar, describes an animal under the name of *Falanouc*, which Doyère thinks he has identified with a young animal from Madagascar, sent to the Jardin des Plantes by M. Goudot. He described it under the name of *Eupleres goudotii*; but Schlegel, in the Ned. Tydschr. Dierk. vol. i. p. 292, in his list of Madagascar mammalia, observes it is not at all proved that the *Falanouc* of Flacourt (p. 154) is the *Eupleres goudotii* of naturalists.

Eupleres goudotii is described by M. Doyère, in the Ann. des Sc. Naturelles, 1835, vol. iv. p. 281, tab. xviii., from a very young animal preserved in spirits, and its skull. He describes the fur as very dark brown, with a fulvous under-fur, and two black streaks across the shoulders. The same skull is figured in Blainville's 'Ostéographie' as *Viverra goudotii*, tab. viii., and also the bones of the feet and other parts of the same.

I am not aware that the adult animal of this species has been observed. MM. Pollen and Van Dam do not appear to have observed it; at least it is not so stated in M. Schlegel's list of their animals, nor is it figured in their work.

The British Museum has lately received a large cat-like animal,



J. Smit. lith.

M. & N. Hanhart imp.

EUPLERES GOUDOTI

with a very small head and extremely slender and long nose and a long cylindrical and bushy tail, from Madagascar, under the name of Falanaka, which I was inclined to think might be the adult state of the *Eupleres goudotii* of M. Doyère. But it has no appearance of the black bands across the shoulders which he describes and figures, and therefore I doubted the identity. But the examination of the skull has entirely set all doubts at rest, for it is certainly the adult state of the skull figured by M. Doyère with its milk-teeth; and therefore I suspect that the existence of the black bands mentioned in his description and shown in the figure may be caused by the manner in which the hairs clustered together when the animal was taken out of spirit and put in position, as they sometimes will do; or it may be that the young animal may be so marked; but I do not think that this is likely.

As the genus has only been described from a young specimen, I send a description of the adult skull and teeth.

Eupleres, Doyère.

Skull very elongate, narrow, nearly three times as long as broad; the brain-case ovate; zygomatic arch long and very slender; orbit large, oblong, very imperfect behind, quite open to the temporal cavity, without any processes either above or below; nose very slender, as long as the breadth of the broadest part of the brain-cavity; nasal bones very slender, elongate; maxillary bones high; interorbital foramen large, inferior; the nose divided in the middle about one third of its length; palate narrow, rather wider behind, rather concave in the middle of its length, truncated behind, the opening of the internal nostril, some distance behind the last grinder, elongated, with nearly parallel sides.

Lower jaw very slender, light, with a long produced subcylindrical angle behind, narrow and rather flattened in front, with a rather elongated symphysis. Cutting-teeth $\frac{6}{6}$; the upper small, truncated, forming a close arched series, the outer on each side being rather the largest; the lower smaller, forming a much smaller arched series, the outer on each side being the largest.

Canines $\frac{1}{1} . \frac{1}{1}$; the upper small, conical, and much compressed and recurved, not quite so large as the first false grinder, and placed at a small distance from the outer cutting-tooth; the lower very small, close to and of the same form and size as the outer cutting-tooth.

Grinders $\frac{6}{6} . \frac{6}{6}$; the upper false grinders three on each side, compressed and very far apart; the first very like and a very slight distance from the canine, and, like it, recurved; the second separated by an equally broad space from the first; and the third is compressed, with a recurved tip and an acute compressed lobe on the hinder edge; the third close to the flesh-tooth, forming with the other three hinder grinders a connected series like the preceding, but wider, with a very obscure process on the front edge, a broad compressed one on the hind edge, and a central conical recurved process. The flesh-tooth like the preceding, but with a subtriangular crown



with a very small head and extremely slender and long nose and a long cylindrical and bushy tail, from Madagascar, under the name of Falanaka, which I was inclined to think might be the adult state of the *Eupleres goudotii* of M. Doyère. But it has no appearance of the black bands across the shoulders which he describes and figures, and therefore I doubted the identity. But the examination of the skull has entirely set all doubts at rest, for it is certainly the adult state of the skull figured by M. Doyère with its milk-teeth; and therefore I suspect that the existence of the black bands mentioned in his description and shown in the figure may be caused by the manner in which the hairs clustered together when the animal was taken out of spirit and put in position, as they sometimes will do; or it may be that the young animal may be so marked; but I do not think that this is likely.

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Grinders $\frac{6}{6} . \frac{6}{6}$; the upper false grinders three on each side, compressed and very far apart; the first very like and a very slight distance from the canine, and, like it, recurved; the second separated [illegible] an equally broad space from the first; and the third is compressed, [illegible] tip a[illegible] compressed lobe on the hinder [illegible]h, forming with the other three [illegible] the preceding, but wider, [illegible] edge, a broad compressed [illegible]l recurved process. The [illegible]h a subtriangular crown

produced by a subanterior lobe on the inner side, and a more distinct lobe on the front edge, and a larger one on the hinder edge.

The first tubercles triangular, nearly equilateral, with three blank tubercles on the outer side of the crown, and a larger tubercle on the anterior internal process. The second tubercular grinder smaller, triangular, rather wider than long, with concave arched sides.

The three lower false grinders separated from each other by equal spaces like the upper ones; the first conical, compressed, some distance from and twice the size of the lower canine, which it resembles in shape; the second larger, compressed, with a very slight lobe on the front and a more distinct lobe on the hinder edge, and a high central cone; the third somewhat like the second but larger, with a more distinct anterior and a large posterior lobe. The lower carnivorous tooth oblong, with three anterior lobes placed in a triangle, and a large posterior one; the tubercular grinder similar to the preceding, but much larger and with larger anterior lobes, having a small lobe in the centre between the other three, and a very large hinder portion with a tubercle on the hinder margin.

Head elongate; nose very much produced, elongate, conical, acute, rounded beneath, with a very narrow central groove; whiskers slender, moderately long; muzzle bald, cartilaginous; nostrils open on the side; lower jaw narrow in front; ears rounded, hairy on the outside. Body elongate, rather slender, closely covered with hair; legs moderate, of equal length. Soles of the feet with 6 pads, one central; toes 5 . 5, buried in the skin to the claws; the front toes 4, with elongated arched compressed claws, the inner toe shorter; claws of the hind feet short, of the inner toe abortive; the hinder side of the tarsus hairy; the tail rather shorter than the body, cylindrical, truncate, covered with abundance of hair, which is rather longer than that on the back.

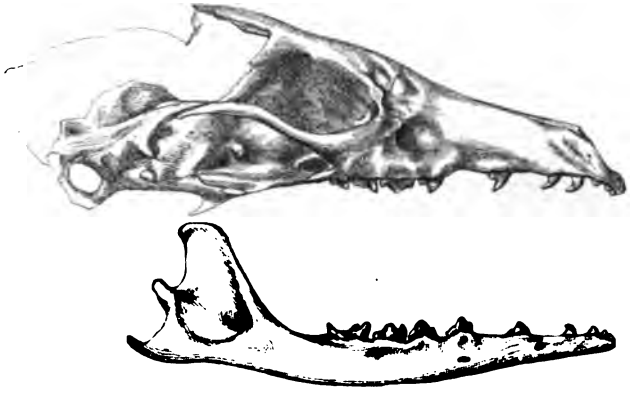
I believe the adult animal and its skull show that I placed the genus in its correct position in the 'Proceedings' of the Society in 1864, and in the 'Catalogue of Carnivorous Mammalia in the British Museum,' when I arranged it near *Crossarchus*, in the family *Rhinogalidæ*. M. Doyère considered it an insectivorous animal, regarding the front double-rooted tooth in the lower jaw as a canine; but Blainville properly regarded it as more allied to the *Viverridæ*. And this decision is proved by the examination of Blainville's figure of the young skull, tab. xii., and the examination of our older skull, both of which show that the small tooth in the upper jaw, which I have called the canine, is placed just behind the suture, between the maxillary and intermaxillary bones, which is the normal situation of the canine.

It differs from the other genera of the family in the smallness of the head, the great slenderness of the nose, and in the small size of the canine teeth; and for this reason I think it ought to form a separate tribe of the family *Rhinogalidæ*, which would be called *Euplerina*.

The head of the animal, and also the skull, becomes longer and more slender in comparison with its breadth as it arrives at the adult age; and the great distance of the false grinders from each

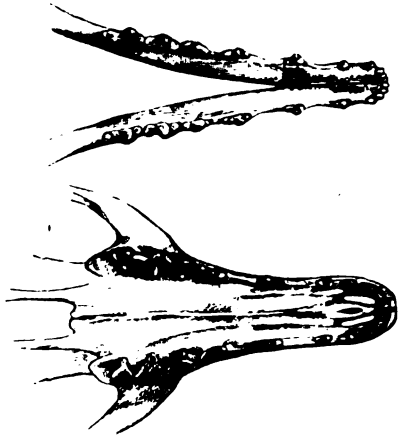
other and the similarity of the first to the canine, as well as their recurved tips, are peculiar to this genus.

Fig. 1.



Skull of *Eupleres goudoti*.

Fig. 2.



Upper and lower jaws of *Eupleres goudoti*.

EUPLERES GOUDOTII. (Plate LI.) B.M.

Fur olive, minutely punctulated with yellow; cheeks, temples, chin, throat, belly, inside of limbs, brownish white; underside of the base of the tail paler than the upperside.

Eupleres goudotii, Doyère, Ann. Sci. Nat. 1835, iv. p. 281, t. 18 (animal and skull); Gray Proc. Zool. Soc. 1864, p. 578; Cat. of

Carnivorous Mamm. Brit. Mus. p. 177; De Blainville, Ostéogr. *Viverra*, tab. viii. (skull), xi., xii. (other bones).

Falanaka, Gray, Ann. & Mag. Nat. Hist. 1870, vol. vi. p. 424. Length of body and head 22 inches, tail 10½ inches, =32½ inches.

Hab. Madagascar.

6. Notes on *Hapalemur simus*, a new Species lately living in the Gardens of the Society. By Dr. J. E. Gray, F.R.S. &c.

(Plate LII.)

Every day, as the osteology of the species is more studied, brings to our knowledge the fact that Mammalia which are so alike in external appearance as not to be distinguishable, prove on the examination of the bones, and especially of the skulls, to belong to very distinct species; and some even, as in the leaf-nosed Bats and American Tapirs, prove to be very distinct genera. The animal I am about to bring before the Society is an example of this kind among the *Lemuridæ*.

Mr. Bartlett during the autumn brought to the British Museum a Lemur which had died in the Society's Gardens to be determined, that its name might be entered in the list of recent accessions; and I agreed to purchase it for the collection. On the casual inspection of the animal in its dead state I believed it to be a large specimen of *Hapalemur griseus*. The preserved specimen and skull were exhibited on November the 1st. On examining the animal before it was placed in the public room of the British-Museum collection, I was convinced that it was of a very distinct species from *Hapalemur griseus*, then in the Museum, and I have therefore sent to the Society the following notes showing the distinctions of the two species.

I. *Nose tapering, narrow in front. Skull—nose tapering, narrow in front; palate dilated behind; series of grinders converging in front; lower jaw broad and strong in front, with a long symphysis.* Hapalemur.

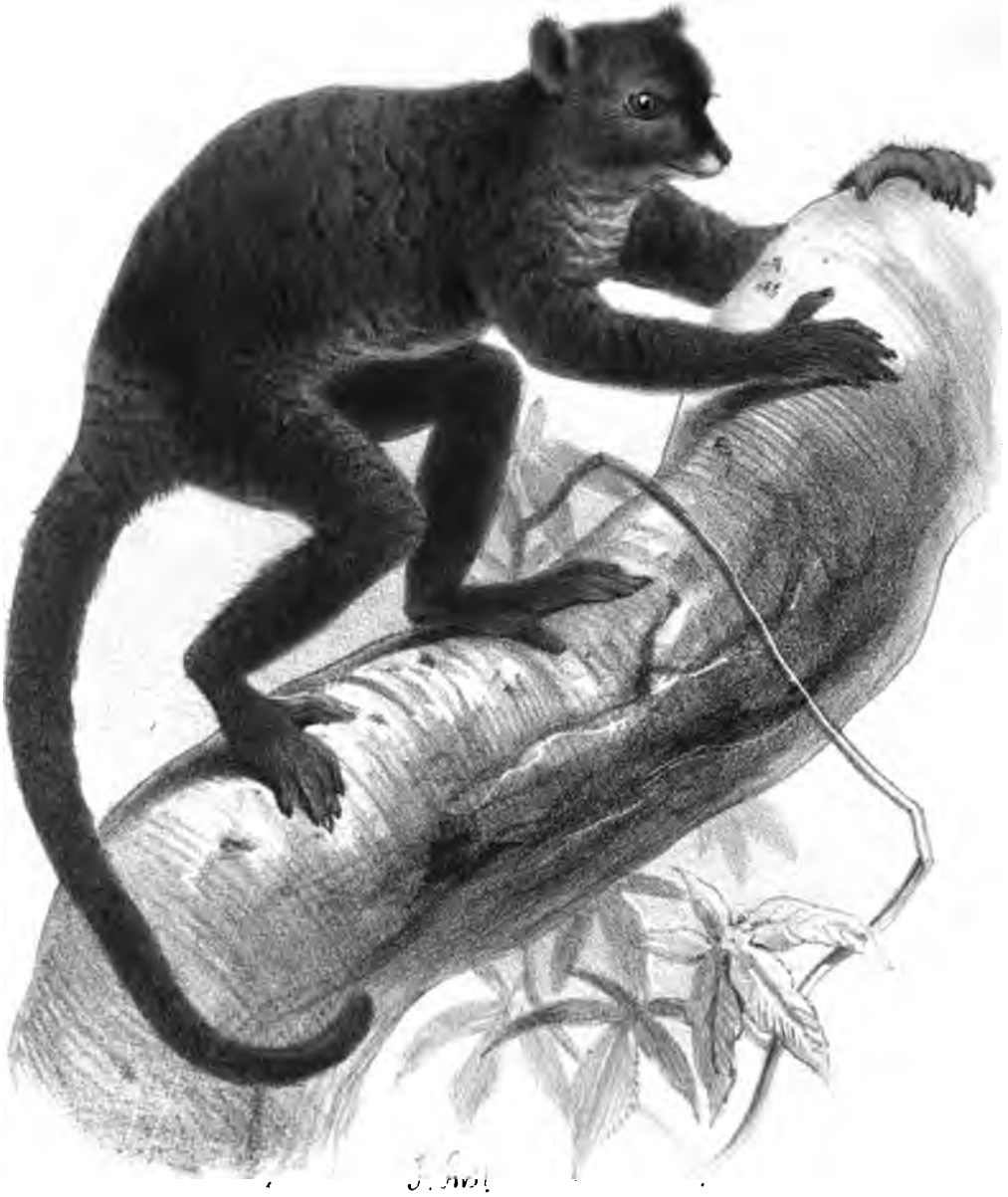
Hapalemur griseus. B.M.

Hapalemur griseus, Sclater, Proc. Zool. Soc. 1863, p. 181; Mivart, Proc. Zool. Soc. 1864, p. 613, fig., skull (copied, Catal. Monkeys &c. in B. M. p. 77).

II. *Nose broad and truncated. Skull—nose very broad, square, truncated in front; palate scarcely wider behind; series of grinders wide apart and nearly parallel; lower jaw weak and narrow in front, with a short symphysis.* Prolemur.

Hapalemur simus, sp. nov. (Plate LII.) B.M.

Back iron-grey, with a rufous tinge; the hairs black, with a sub-



J. Smit lith.

M & N Hanhart imp.

HAPALEMUR SIMUS

apical rufous band, and the lower part lead-coloured; throat whitish; spot on rump at base of tail yellowish.

Hab. Madagascar.

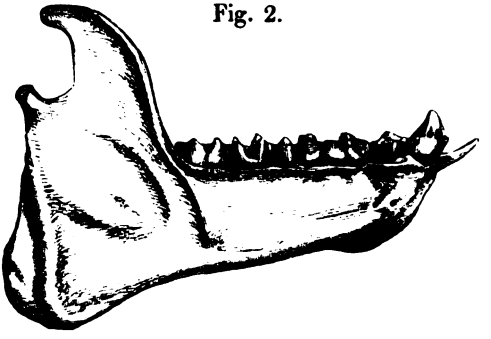
This may be *Hapalemur olivaceus*; but that species is very imperfectly described, and it is said to have a different form of the hinder part of the lower jaw; but what the difference is, is not mentioned, and I do not see any difference in the hinder part of the lower jaws of the two species. The front of the jaw in *H. griseus* is very much more slender and weak than in *H. simus*.

Fig. 1.



Hapalemur simus.

Fig. 2.

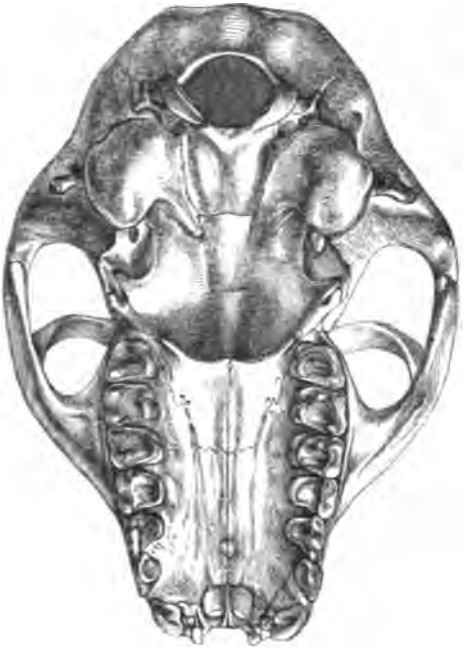


Hapalemur simus.

The skull rather solid; nose broad, truncated in front; palate slightly concave, nearly as broad before as behind, the teeth-series being nearly parallel: cutting-teeth $\frac{4}{6}$; the upper subcylindrical, close by the front side of the canine; inner rather the smallest; lower shelving, in two groups, the four inner much compressed: canines $\frac{1}{1}$.$\frac{1}{1}$; upper triangular, conical; lower rather compressed, with a conical lobe on the front edge.

The animal on which this species is established is full-grown; but

Fig. 3.



Hapalemur simus.

Fig. 4.



Hapalemur simus.

the state of the hinder grinders shows that it had not reached adult age; it shows no sign of sexual organs, but is most probably a female.

It died soon after its arrival at the Gardens, and unfortunately had not had time to recover the effects of its confinement on the voyage.

The tips of the long hairs of the fur of the greater part of the body have been worn off, leaving only a lead-coloured cottony wool. The head, neck, and outside of limbs, where the tips of the long hairs remain, are exactly the same colour as the fur of the British-Museum specimen of *Hapalemur griseus*, not showing the slightest reason for believing that one would be called *H. griseus* and the other *H. olivaceus*.

I have retained the name of *H. griseus* for the specimens we received from Dr. Meller, which Mr. Sclater determined in the 'Proceedings' of this Society to be of that species, but which have the fur much more fit to be called olivaceous than grey.

P.S.—I have to-day (Dec. 9th) been able to obtain from the Society Pollen and Van Dam's 'Faune de Madagascar;' and I see clearly that the animal that I have described as *Hapalemur simus* is the *Hapalemur griseus* of those authors (p. 6, tab. iii.); for at tab. vii. fig. 4 they figure the skull, showing the truncated form of the nose and the wide palate. They consider it the same as the *Hapalemur griseus* of Geoffroy St.-Hilaire, and also *Hapalemur olivaceus* of Isidore Geoffroy, observing, "Le crâne avec ses dents ne s'éloigne en aucune manière de celui du soi-disant *Lemur griseus*; mais cette partie présente, suivant les individus, des différences très-sensibles par la forme des orbites, tantôt orbiculaires, tantôt un peu elliptiques, par les nasaux tantôt saillants, tantôt rentrants, par le manque ou l'existence d'incisive à la mâchoire supérieure, et par d'autre traits de moindre importance."

I had no doubt of *H. simus* being quite distinct from what we had called *H. griseus* in England. The upper cutting-teeth of the Museum skull of *H. simus* are as distinct as they are in *H. griseus*.

7. Descriptions of three apparently new Species of Tyrant-birds of the Genus *Elainea*, with Remarks on other known Species. By P. L. Sclater, M.A., Ph.D., F.R.S.

1. Elainea gigas, sp. nov. (Fig. 1, p. 832.)

Elainea albiceps, Scl. P. Z. S. 1860, p. 71, et Cat. A. B. p. 217 (nec Lafr. et D'Orb.).

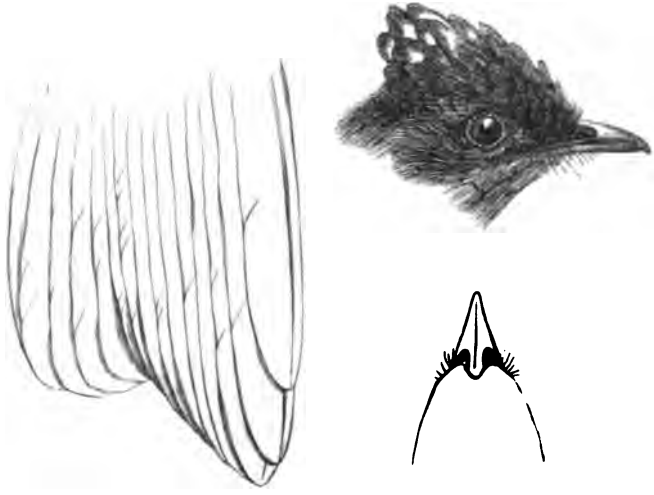
Supra fuscescenti-olivacea, uropygio paulo dilutiore: pilei medii plumis ad basin late albis, fusco terminatis: alis caudaque fuscis, alarum tectricibus et secundariis albido marginatis: remigibus primariis et rectricibus olivaceo anguste fimbriatis: subtus pallide grisea, subalaribus, remigum marginibus internis

et ventre medio cum crisso flavido indutis: rostro pallide corneo, mandibula albicantiore, pedibus fuscis: long. tota 7·5, alæ 3·7, caudæ 3·1, tarsi 0·8, poll. Angl.

Hab. Respubl. Æquator. in ripis fl. Napo.

Obs. Sp. crassitie majore et pilei plumis late albis ab *E. pagana*, cui forma similis, distincta.

Fig. 1.



Elainea gigas.

I formerly referred this *Elainea* to the *Muscipeta albiceps* of Lafr. et D'Orb., but discovered my error on obtaining specimens of the latter bird from Eastern Peru (see P. Z. S. 1868, p. 174). *E. gigas*, as I now propose to call it, is the largest species of the genus that I am acquainted with, slightly exceeding in size even *E. obscura*. It is not unlike the latter species generally, but has a large and conspicuous white crest, the feathers of which are margined with the colour of the head.

2. ELAINEA FALLAX, sp. nov. (Fig. 2, p. 833.)

Elainea, sp. ex Jamaica, Sclater, P. Z. S. 1860, p. 314.

E. fallax, Sclater, P. Z. S. 1861, p. 407, et Cat. Am. B. p. 217 (descr. nulla!).

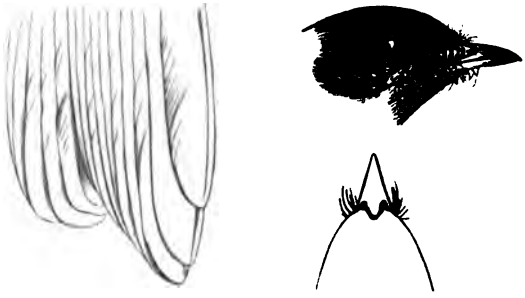
Supra obscure olivacea, capite nigricantiore, pilei medii plumis ad basin albis: alis extus nigricantibus, tectricibus albo terminatis, secundariis hoc colore extus marginatis; primariis extus olivaceo anguste fimbriatis: cauda fusca, rectricibus extus olivaceo anguste fimbriatis: subtus pallide flavida, subalaribus flavidis, remigum marginibus internis albescentibus:

rostro corneo, mandibula ad basin pallide carnea, pedibus fuscis : long. tota 5·2, *alæ* 2·5, *caudæ* 2·4, *tarsi* 0·6.

Hab. ins. Jamaica.

I find I have accidentally omitted hitherto to give a description of this species of *Elainea*, of which I obtained two skins some years ago along with a large series of other Jamaican birds.

Fig. 2.



Elainea fallax.

Mr. March (Pr. Ac. Phil. 1863, p. 290) suggests that this bird may be the young of *E. cotta*. But this cannot be the case, I think, as I have young and old of the latter. *E. fallax* belongs to the section with a concealed *white* crest, and has the wing-coverts terminated with white. *E. cotta* (♂) has a bright yellow crest (see Gosse's figure, Ill. B. Jam. pl. xlv.), which is deficient in the female or young, and has plain unspotted wings. I have no doubt of the distinctness of the two species.

3. ELAINEA PUDICA, sp. nov. (Fig. 3, p. 834.)

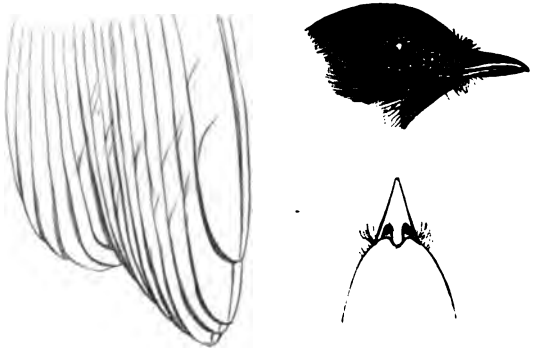
Supra obscure olivacea unicolor; alis caudaque nigricantibus, alarum tectricibus albido terminatis, fascias duas alares exhibentibus; secundariis quoque extus albido late marginatis: cauda olivaceo extus anguste fimbriata : subtus pallide flavida, ventre medio dilutiore, gutture et pectore toto griseo perfusis : subalaribus et remigum marginibus internis pallide flavidis : rostro brevi, angustato, nigricante; mandibula, præcipue ad basin, carneo : pedibus obscure corneis : long. tota 5·5, *alæ* 2·8, *caudæ* 2·5, *tarsi* 0·6.

Hab. Respubl. Colombica, Bogotá (*Mus P. L. S.*); Chiriqui (*Arcé*); Venezuela, prope Merida (*Goering*).

I have long had two Bogotá specimens of this *Elainea* in my collection under the MS. name now published, and have lately obtained a third skin of it from Mr. Goering. From Arcé Salvin has recently also received a single example, apparently of the same species, and I was consequently in some hopes of being able to recognize in it one of the Central-American *Elaineæ* lately described

by Mr. Lawrence. Failing to do this I have resolved to describe it as new.

Fig. 3.



Elainea pudica.

This *Elainea* belongs to the *third* section of the genus as arranged in my "Index generis Elaineæ" *, having no vertical spot whatever. It is remarkable for its short and compressed bill.

I add a list of, with a few remarks on, the species of this very puzzling genus of Tyrannidæ represented in my collection.

Sect. A. *Species capitis subcristati plumis intus albis.*

1. *E. pagana* (Licht.); Scl. Cat. A. B. p. 216.

Under this name I now believe we shall have to reunite the species separated by me as *E. subpagana* and *E. semipagana*, and thus recognize one rather variable species extending from Southern Mexico to the wood-region of S.E. Brazil. I have now fifteen skins of this bird from various localities, and so have a better opportunity of judging of them than formerly. It should be mentioned, however, that there is much more white in the crests of northern specimens than in those from S.E. Brazil.

2. *E. riisii*, Scl.; Cat. A. B. p. 217, ex ins. S. Thomas.

I am now a little doubtful about the validity of this species also. It may turn out to be only the same as the former; but more specimens are required, especially from the intervening islands between S. Thomas and Tobago.

3. *E. albiceps* (Lafr. et D'Orb.).

I am now disposed to unite under this name the specimens from E. Peru, Chili, and Buenos Ayres usually called *E. modesta* (Tsch.), and birds from Western Peru called *E. albiceps* by Mr. Salvin and myself (P. Z. S. 1868, pp. 174 et 568), although the latter are unusually large in size, and of a rather purer white on the throat. If this view be correct, the range of this species will be a wide one, from

* P. Z. S. 1861, p. 406.

Eastern Peru to Buenos Ayres on the eastern side of the Andes, and Western Peru to Chili on the western side. I have also typical specimens of *E. cristata* and *E. albivertex* of Pelzeln (Orn. Bras. p. 177), and am rather inclined to consider these also inseparable from *E. albiceps*. I have already pointed out that my *E. griseigularis* is the same bird (see P. Z. S. 1867, p. 327).

4. *E. gigas*, sp. nov., ex reip. Æquator. reg. orient.

5. *E. pallatangæ*, Scl., ex. reip. Æquat. reg. occ.

6. *E. fallax*, sp. nov., ex Jamaica.

Sect. B. *Sp. capitis subcristati plumis interne flavis.*

7. *E. placens*, Scl., ex Am. Centr. a Mexico usque ad isthmum Panamensem, et reip. Æquat. litt. occident.

We have now traced the species down to Panama, and I consider my *E. implacens* (ex rep. Æquator.) no longer tenable.

8. *E. subplacens*, Scl., ex reip. Æquator. reg. occ.

9. *E. cotta*, Gosse, ex Jamaica.

10. *E. elegans*, Pelzeln, ex Amazonia, Columbia et Guiana.

11. *E. caniceps*, Sw., ex Columbia et Peruvia.

Sect. C. *Sp. pileo unicolori.*

12. *E. obscura* (Lafr. et D'Orb.), ex Brasil. merid.

Under this (older) name I now unite the specimens arranged in my catalogue under *E. olivacea* and *E. rustica*. I have additional skins from Ypanema (*Natterer*), and Lagoa Santa (*Lund*).

13. *E. mesoleuca*, Cab. et Heine, ex Brasil. merid.

14. *E. frantzii*, Lawrence, Ann. L. N. Y. vii. p. 173, ex Costa Rica.

15. *E. pudica*, Sclater, ex Columbia et Chiriqui.

16. *E. affinis*, Burm. Syst. Ueb. ii. p. 147; Pelz. Orn. Bras. p. 191, ex Brasil. int.

8. On Birds collected by Mr. George M. Whitely on the Coast of Honduras. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A.

Mr. George M. Whitely went out to Honduras in the autumn of 1869 in company with the contractors engaged upon the first section of the Interoceanic line, and remained about six months in that country. Mr. Whitely's health unfortunately gave way; and he was consequently obliged to return home with much smaller collections than would otherwise have been the case. But we think it nevertheless expedient, in the interests of geographical distribution, to place on record an exact list of the species of birds obtained in

this district, to which we have added a few notes where such explanations are called for.

The previous authorities on the birds of the Republic of Honduras are two only.:—

1. Mr. Moore's list of Leyland's collections in Honduras, Belize, and Guatemala, given in P. Z. S. 1859, p. 50.

2. Mr. G. C. Taylor's articles on the birds collected and observed during his journey across the isthmus from Fonseca Bay to Omoa in 1857–8, published in 'The Ibis' for 1860.

Mr. Whitely's series of about 520 skins was obtained in the vicinity of Puerto Cabello, Julian, Medina, and San Pedro. The three latter places are situated in the low forest-lands on the Chamelicon river, San Pedro, the furthest inland being not more than 30 miles from Puerto Cabello, the Atlantic terminus of the proposed railway. These specimens are referable to 135 species, of which the list is subjoined, the nomenclature, as usual, being that of Sclater's 'Catalogue of American Birds.'

Fam. TURDIDÆ.

*1. *Turdus tristis.*
2. —— *grayi.*
3. *Galeoscoptes carolinensis.*

Fam. TROGLODYTIDÆ.

4. *Campylorhynchus capistratus.*
5. *Thryothorus maculipectus.*
6. —— *modestus.*

Fam. SYLVICOLIDÆ.

7. *Henicocichla auricapilla.*
8. —— *noveboracensis.*
9. *Helminthophaga peregrina.*
10. *Dendræca coronata.*
11. —— *cærulea.*
12. —— *pennsylvanica.*
13. —— *æstiva.*
14. *Geothlypis trichas.*

Fam. VIREONIDÆ.

15. *Icteria viridis.*
16. *Vireosylvia olivacea.*
17. *Hylophilus decurtatus.*

Fam. HIRUNDINIDÆ.

18. *Progne leucogastra.*

Fam. CŒREBIDÆ.

19. *Cœreba cyanea.*
20. *Chlorophanes guatemalensis.*

Fam. TANAGRIDÆ.

21. *Euphonia hirundinacea.*
22. *Calliste larvata.*
23. *Tanagra diaconus.*
24. —— *abbas.*
25. *Ramphocœlus sanguinolentus.*
26. —— *passerinii.*
27. *Pyranga æstiva.*
28. *Phœnicothraupis ruficoides.*
29. *Eucometis spodocephala.*
30. *Saltator atriceps.*
31. —— *grandis.*
32. —— *magnoides.*
33. *Pitylus poliogaster.*

Fam. FRINGILLIDÆ.

34. *Hedymeles ludovicianus.*
35. *Guiraca concreta.*
36. *Spermophila moreleti.*
37. —— *corvina.*
38. *Volatinia jacarina.*
39. *Cyanospiza ciris.*
40. —— *cyanea.*
41. *Euspiza americana.*

Fam. ICTERIDÆ.

42. *Ocyalus wagleri.*
43. *Ostinops montezumæ.*
44. *Cassiculus prevosti.*
45. *Icterus baltimorensis.*

*46. *Icterus mesomelas.*
47. —— *prosthemelas.*
48. —— *spurius.*
49. *Quiscalus macrurus.*

Fam. CORVIDÆ.

50. *Cyanocorax guatemalensis.*
*51. *Psilorhinus mexicanus.*

Fam. DENDROCOLAPTIDÆ.

52. *Synallaxis erythrothorax.*
53. *Dendromanes anabatinus.*
54. *Dendrornis eburneirostris.*
*55. —— *nana.*
56. *Picolaptes compressus.*

Fam. FORMICARIIDÆ.

57. *Thamnophilus melanocrissus.*
58. —— *affinis.*
59. *Cercomacra tyrannina.*
60. *Formicivora boucardi.*

Fam. TYRANNIDÆ.

61. *Attila citreopygius.*
62. *Todirostrum cinereum.*
63. *Mionectes assimilis.*
64. *Elainea subpagana.*
65. *Myiozetetes texensis.*
66. *Myiodynastes luteiventris.*
67. *Rhynchocyclus cinereiceps.*
68. *Megarhynchus mexicanus.*
69. *Pitangus derbianus.*
70. *Contopus virens.*
71. *Empidonax flaviventris.*
72. —— *minimus.*
73. *Myiarchus lawrencii.*
74. —— *cooperi.*
75. *Tyrannus melancholicus.*
76. —— *pipiri.*

Fam. COTINGIDÆ.

77. *Tityra personata.*
78. —— *fraseri.*
79. *Hadrostomus aylaiæ.*
80. *Heteropelma veræ pacis.*
81. *Pipra mentalis.*
82. *Chiromachæris candæi.*

Fam. MOMOTIDÆ.

83. *Momotus lessoni.*
84. *Eumomota superciliaris.*

Fam. ALCEDINIDÆ.

85. *Ceryle torquata.*
86. —— *cabanisi.*
87. —— *superciliosa.*

Fam. GALBULIDÆ.

88. *Galbula melanogenia.*

Fam. TROGONIDÆ.

89. *Trogon melanocephalus.*

Fam. CAPRIMULGIDÆ.

90. *Nyctidromus albicollis.*

Fam. TROCHILIDÆ.

91. *Lampornis prevosti.*
92. *Florisuga mellivora.*
93. *Petasophora delphinæ.*

Fam. CUCULIDÆ.

94. *Crotophaga sulcirostris.*
95. *Piaya melheri.*
*96. *Coccyzus minor.*

Fam. RAMPHASTIDÆ.

97. *Ramphastus carinatus.*
98. *Pteroglossus torquatus.*
99. *Aulacorhamphus prasinus.*

Fam. PICIDÆ.

100. *Dryocopus scapularis.*
101. *Celeus castaneus.*
102. *Centurus santacruzi.*
103. —— *pucherani.*
*104. *Picumnus olivaceus.*

Fam. PSITTACIDÆ.

105. *Conurus astec.*
106. *Chrysotis guatemalæ.*
107. —— *autumnalis.*
108. *Caica hæmatotis.*
109. *Pionus senilis.*

ACCIPITRES.

110. *Polyborus tharus.*
111. *Ibycter americanus.*
112. *Herpetotheres cachinnans.*
113. *Spizaëtus tyrannus.*
114. *Urubitinga anthracina.*
115. *Geranospiza nigra.*
116. *Accipiter bicolor.*
117. *Micrastur guerilla.*
118. *Asturina plagiata.*
119. —— *ruficauda.*
120. *Cymindis cayennensis.*
121. *Tinnunculus sparverius.*
122. *Hypotriorchis rufigularis.*

COLUMBÆ.

123. *Columba rufina.*
124. *Melopelia leucoptera.*
125. *Chamæpelia rufipennis.*
126. *Leptoptila albifrons.*
127. —— *plumbeiceps.*

CRACIDÆ.

128. *Crax globicera.*
129. *Ortalida vetula.*

TINAMIDÆ.

130. *Crypturus boucardi.*

LIMICOLÆ.

131. *Ægialites vociferus.*
132. *Rhyacophilus solitarius.*

RALLIDÆ.

133. *Aramides albiventris.*
134. *Heliornis fulica.*

LARIDÆ.

135. *Anous stolidus.*

On looking through this list it becomes apparent that the ornithology of this part of Honduras, so far at least as is shown by Mr. Whitely's collection, differs in hardly any respect from that of the lowlands of Vera Paz, which has been already thoroughly explored. Out of these 135 species there are only three (*Dendrornis nana*, *Coccyzus minor*, and *Picumnus olivaceus*) that have not been observed in the above-named department of the adjoining Republic of Guatemala. Of these three exceptions, *Coccyzus minor* is of wide distribution and may likewise occur in Guatemala; but the other two are southern species which appear here at the most northern limit of their range.

We subjoin a few remarks upon such of the above-mentioned species as require notice.

1. TURDUS TRISTIS, Sw.; Scl. et Salv. Ex. Orn. p. 145.

Out of three skins in Mr. Whitely's collection one belongs to the ashy-backed variety (*T. leucauchen*, Sclater); the other two are intermediate between this and the Mexican form *T. assimilis*, Cab. This confirms us in our opinion (expressed Ex. Orn. p. 145), that the two species may be safely reunited under Swainson's older name. See also Mr. Salvin's remarks on this Thrush (P. Z. S. 1867, p. 132).

46. ICTERUS MESOMELAS, Wagler.

Mr. Cassin, in his study of the *Icteridæ* (Pr Ac. Sc. Phil. 1867, p. 51), has separated the southern form of this bird as *I. salvini*, distinguishing it by the absence of the narrow external yellowish margin of some of the secondaries, and its larger size. We do not consider this proposed species to be well founded. In the present examples some possess the yellow margin, but others not. In a

Bogotá skin in Sclater's collection this character is present. Nor can we find much difference as regards size, in specimens from different localities—Mexico, Honduras, Panama, and Bogotá.

51. PSILORHINUS MEXICANUS (Rüpp.).

Mr. Whitely's skins belong, like Mr. Taylor's and all others from southern localities, to the white-tailed form. See our remarks, P. Z. S. 1869, p. 363.

55. DENDRORNIS SUSURRANS (Jardine).

Dendrocolaptes susurrans, Jard. Ann. N. H. xix. p. 81.

Dendrornis susurrans, Eyton, Contr. Orn. 1852, p. 23; Sclater, Cat. A. B. p 165; Scl. et Salv. P. Z. S. 1868, pp. 167, 627, et 1869, p. 252.

Nasica susurrans, Lafr. Rev. Zool. 1850, p. 425; Léotaud, Ois. de Trin. p. 160.

Dendrornis nana, Lawr. Ibis, 1863, p. 181 (?).

Dendrornis nana, Scl. et Salv. P. Z. S. 1864, p. 355; et Salvin, P. Z. S. 1870, p. 193 (*certé*).

After comparing Mr. Whitely's specimen of this *Dendrornis* with fifteen others from various parts of the Central-American isthmus (Costa Rica, Veragua, and Panama), which we have hitherto called *D. nana* (ex Lawrence), and with Venezuelan, Trinidad, and Tobago skins of *D. susurrans*, we have come to the conclusion that they all belong to one species. Upon one of the smaller-sized individuals Mr. Lawrence appears to have established his *D. nana*; and we are inclined to suppose that the birds called *D. guttatus* (Ann. L. N. Y. vii. p. 292) and *D. pardalotus** (ibid. viii. pp. 4, 180, and ix. p. 107) likewise belong to this same species.

We have never met with more than *three* other species of this genus of Dendrocolaptidæ from any district north of Panama. These are:—

1. *D. eburneirostris*. Mexico, Guatemala, and Honduras.
2. *D. lachrymosa*. Nicaragua, Costa Rica, Veragua, and Panama.
3. *D. erythropygia*. Southern Mexico down to Panama.

We are not acquainted with *D. mentalis*, recently described by Mr. Lawrence from Northern Mexico (Ann. viii. p. 48).

96. COCCYZUS MINOR (Gm.).

See Sclater's remarks on this species, P. Z. S. 1870, p. 166.

104. PICUMNUS OLIVACEUS (Lafr.).

This is the most northern locality yet recorded for any species of this genus. The specimens agree with Bogotá skins, and with those from Veragua received by Mr. Salvin (*cf.* P. Z. S. 1870, p. 212). No other *Picumnus* is known from north of Panama.

* A skin in the collection of *Dendrocolaptidæ* belonging to the Smithsonian Institution now under Sclater's examination, which is marked *D. pardalotus* in Mr. Lawrence's handwriting, certainly belongs to *D. susurrans*.

9. Descriptions of five new Species of Birds from the United States of Columbia. By P. L. Sclater, M.A., Ph.D., F.R.S., and Osbert Salvin, M.A., F.L.S.

(Plate LIII.)

1. Pheucticus uropygialis, sp. nov.

Pheucticus aureoventer, Sclater, P. Z. S. 1855, p. 154.

Supra niger; rectricum alarium fasciis duabus cum speculo alari albis; uropygii plumis flavis nigro terminatis: subtus ad medium pectus niger, abdomine flavo, lateribus nigro variegatis; tectricibus subalaribus flavis: cauda nigra, rectricibus lateralibus albo terminatis: rostro nigro ad basin plumbeo, pedibus nigris: long. tota 8, *alæ* 4·5, *caudæ* 3·7 *poll. Angl.*

Hab. In int. Columbia.

Mus. P. L. S. et S.-G.

Obs. Similis *P. aureoventri*, Lafr. et D'Orb., ex Bolivia, sed uropygio flavo diversus.

We found this species on a "Bogotá" skin in Sclater's collection. Mr. C. Wyatt has lately obtained a specimen of the same bird in the Sierra Ocaña of Columbia. It is probable that Fraser's skins from Riobamba, Ecuador, referred by Sclater (P. Z. S. 1858, p. 551) to *P. aureoventer* may belong here; but the specimens are not adult, and show no black on the throat. We may also remark that they have the crissum white, and not yellow as in the Bogotá bird. There are likewise Bogotá skins of this species in the collection of Messrs. Salvin and Godman, and in the British Museum.

There appear to be now known five species of this form, viz.:—

(1) *P. chrysopeplus* (Vig.). From Western Mexico; lately discriminated by Finsch, Abh. Nat. Ver. z. Bremen, 1870, p. 339.

(2) *P. tibialis*, Lawr. Ann. Lyc. N. Y. viii. p. 478. From Costa Rica and Veragua.

(3) *P. chrysogaster* (Less.); Scl. Cat. Am. B. p. 100 (syn. excl.). From Ecuador and Venezuela.

(4) *P. uropygialis*. From the highlands of Columbia.

(5) *P. aureiventris*, Lafr. et D'Orb. From the highlands of Bolivia.

2. Synallaxis wyatti, sp. nov.

Supra fusca, nigro striata: tectricum alarium marginibus et remigum macula magna basin occupante cum subalaribus rufis: subtus pallide ochracea, pectore paulo obscuriore et punctis paucis nigris asperso, gula alba flavicante tincta: caudæ rectricibus duodecim, tribus lateralibus rufis, scapis nigris, ceteris nigricantibus rufo paulum variegatis: rostro elongato, acuto, corneo, ad basin pallidiore: pedibus fuscis: long. tota 6, *alæ* 2, *caudæ rectr. lat.* 1·6, *med.* 2·8, *rostri a rictu* 0·7.

Hab. Paramo of Pamplona, New Granada (*Wyatt*).

Mus. P. L. S.



J Smit lith.

M & N Hanhart imp

1. TYRANNISCUS LEUCOGONYS.
2. — CINEREICEPS.

Obs. Proxima *S. anthoidi*, sed striis dorsi angustioribus et crebrioribus, et rectricibus externis rufis distinguenda.

3. TYRANNISCUS LEUCOGONYS, sp. nov. (Plate LIII. fig. 1.)

Tyranniscus, sp., Scl. Cat. Am. B. p. 216. no. 1320.

Supra olivaceus; pileo toto dilute cinereo, fronte et capitis lateribus albo variegatis; alis caudaque fusco-nigricantibus, alarum tectricibus et remigibus flavicanti-olivaceo marginatis, rectricum marginibus olivaceo stricte fimbriatis: subtus pallide limonaceo-flavus, subalaribus limonaceo-flavis: maxilla cornea, mandibula alba, pedibus corneis: long. tota 4, *alæ* 2·4, *caudæ* 1·7, *rostri a rictu* 0·5.

Hab. In int. Columbia.

Mus. P. L. S.

Two Bogotá skins of this small Tyrant are in Sclater's collection, one having been purchased from Bell of New York in 1856, and the second more recently obtained from the Maison Verreaux.

The species is of about the same size and general appearance as *T. cinereiceps*, Scl., but wants the conspicuous black ear-coverts and the broad whitish spots on the wing-coverts which distinguish that species. It is likewise of a much paler yellow below. The wings are rather long and pointed, the second, third, and fourth primaries being nearly equal and longest.

4. TYRANNISCUS IMPROBUS, sp. nov. (Plate LIII. fig. 3.)

Supra olivaceus; capite obscuriore, frontem versus nigricante; fronte ipsa et regione oculari utrinque albicantibus; loris nigris; alis caudaque nigricantibus, alarum tectricibus et secundariis flavo anguste limbatis; rectricibus extus olivaceo fimbriatis: subtus dilute flavidus, gula et pectore superiore albicantibus, cinereo sublavatis; subalaribus et campterio alari flavidis: rostro et pedibus nigris: long. tota 4·5, *alæ* 2·2, *caudæ* 1·9, *rostri a rictu* 0·5.

Hab. In Andibus Venezuelæ et Columbiæ.

Mus. P. L. S.

Obs. Sp. *Tyrannisco vilissimo*, ex Guatemala, maxime affinis, sed pectore flavidiore et pileo nigricantiore, ut videtur, diversus.

The first specimen of this *Tyranniscus* which occurred to us was obtained near Merida by Mr. Goering*, but we did not venture to describe it from a single specimen. More recently in Mr. C. Wyatt's collection we found a second example, which was obtained by that gentleman in the Sierra Ocaña.

5. TYRANNISCUS GRISEICEPS, sp. nov.

Tyranniscus, sp., Scl. Cat. Am. B. p. 216. no. 1318; Scl. & Salv. P. Z. S. 1869, p. 252.

Supra dilute olivaceus, pileo cinereo; fronte et capitis lateribus albo mixtis: alis caudaque fusco-nigricantibus, alarum tectricum et secundariorum marginibus in olivaceum trahentibus, rectricum marginibus externis dorso concoloribus: subtus limonaceo-flavus, gut-

* See *anteà*, p. 78.

ture albicante, subalaribus flavidis : rostro dilatato, corneo, pedibus obscuris : long. tota 4, *alæ* 2, *caudæ* 1·9.

Hab. Western Ecuador, Pallatanga and Babahoyo (*Fraser*); Venezuela, Lake of Valencia (*Goering*).

Mus. P. L. S.

We base this species upon two skins obtained by Fraser in Ecuador, which have hitherto stood in Sclater's collection under a MS. name. The single specimen, above referred to, obtained by Mr. Goering nearly agrees with these, and belongs, we have little doubt, to the same species.

The bill is rather flatter and broader at the base than in other species of the genus *Tyranniscus*, the wings rather shorter, and the tail somewhat longer. The margins of the wing-coverts, instead of being distinctly defined as in *T. vilissimus* and its two allies *T. parvus* and *T. improbus*, are not nearly so bright and conspicuous. The second, third, fourth, and fifth primaries are nearly equal and longest.

The three species above described increase the number of the members of this obscure genus to nine, which may be arranged as follows :—

Clavis generis Tyrannisci.

a. tectricibus alarum nigris, albo terminatis.
- regione auriculari olivacea : pileo nigro ..... 1. *nigricapillus.*
- regione auriculari nigra : pileo cinereo ..... 2. *cinereiceps.*

b. tectricibus alarum fuscis, flavo distincte marginatis.
- *a'.* pileo dorso concolori : fronte aurea ..... 3. *chrysops.*
- *b'.* pileo cinereo : fronte albida.
  - *a''.* gutture albo aut grisescente.
    - major : pectore grisescente ..... 4. *vilissimus.*
    - major : pectore flavidescente ..... 5. *improbus.*
    - minor : pectore albicante ..... 6. *parvus.*
  - *b''.* gutture flavido perfuso.
    - major : mandibula albicante ..... 7. *leucogonys.*
    - minor : mandibula nigra ..... 8. *gracilipes.*

c. tectricibus alarum fuscis, olivaceo obsolete marginatis ... 9. *griseiceps.*

The synonymy and localities of these nine species are as follows :—

(1) TYRANNISCUS NIGRICAPILLUS.

Tyrannulus nigricapillus, Lafr. Rev. Zool. 1845, p. 341; Sclater, P. Z. S. 1860, p. 93.

Tyranniscus nigricapillus, Cab. et Hein. Mus. Hein. ii. p. 57; Scl. Cat. Am. B. p. 216.

Hab. Ecuador, Puellaro (*Fraser*); Bogotá (*Mus. P. L. S.*).

(2) TYRANNISCUS CINEREICEPS. (Plate LIII. fig. 2.)

Tyrannulus cinereiceps, Sclater, P. Z. S. 1860, p. 69.
Tyranniscus cinereiceps, Scl. Cat. Am. B. p. 216.
Hab. Pallatanga, Ecuador (*Fraser*); Bogotá (*P. L. S.*).

(3) TYRANNISCUS CHRYSOPS.

Tyrannulus chrysops, Sclater, P. Z. S. 1858, p. 458, 1859, p. 144, et 1860, p. 93.

Tyranniscus chrysops, Sclater, Cat. Am. B. p. 216.
Tyrannulus flavidifrons, Scl. P. Z. S. 1860, p. 69.
Tyranniscus flavifrons, Scl. Cat. Am. B. p. 216; Cab. et Hein. Mus. Hein. ii. p. 56 (1859).
Hab. Ecuador and Bogotá (*P. L. S.*); Sierra Ocaña (*Wyatt*).

(4) TYRANNISCUS VILISSIMUS.

Elainea vilissima, Sclat. et Salv. Ibis, 1859, p. 122, pl. 4. f. 1; Salvin, Ibis, 1860, p. 194.
Tyranniscus vilissimus, Scl. Cat. Am. B. p. 216.
Hab. Guatemala.

(5) TYRANNISCUS IMPROBUS.

Hab. Venezuela, Merida (*Goering*); Sierra Ocaña (*Wyatt*).

(6) TYRANNISCUS PARVUS.

Tyranniscus parvus, Lawr. Ibis, 1862, p. 12; Ann. N. Y. Lyc. vii. p. 473; Scl. & Salv. P. Z. S. 1864, p. 359; Salv. P. Z. S. 1867, p. 147.
Hab. Panama (*M'Lennan*); Veragua et Costa Rica (*Arcé*).

(7) TYRANNISCUS LEUCOGONYS.

Hab. Bogotá (*P. L. S.*).

(8) TYRANNISCUS GRACILIPES.

Tyranniscus, sp. 1317, Scl. Cat. A. B. p. 216.
Tyranniscus gracilipes, Sclater, MS.; Scl. & Salv. P. Z. S. 1867, p. 981.
Myiopatis pusilla, Pelz. Orn. Bras. p. 106.
Hab. Eastern Peru, Pebas (*Hauxwell*).

(9) TYRANNISCUS GRISEICEPS.

Hab. Ecuador; Babahoyo and Pallatanga (*Fraser*).

6. TROGON CHIONURUS, sp. nov.

Trogon viridis, Scl. et Salv. P. Z. S. 1864, p. 364; Lawr. Ann. L. N. Y. vii. p. 290.

Similis T. viridi, *sed maris rectricibus externis fere omnino albis, ita ut cauda clausa omnino alba esse videtur. Femina etiam rectricum externarum apices late albos ostendit.*

Hab. Panama (*M'Leannan*).
Mus. S.-G. et G. N. Lawrence.

We have examined numerous specimens of this *Trogon* from Panama, and have hitherto referred it to *T. viridis*. We convinced ourselves some time ago, on examining an example from Mr. Lawrence's collection, that it was not really *T. viridis*, but were then doubtful whether it might not be *T. venustus*, Cab. et Hein. Mus. Hein. ii. p. 194. On going into the question again, aided by additional skins of *T. viridis* from various localities, we feel convinced that

T. venustus (as characterized, *l. c. s.*) cannot be considered really distinct from *T. viridis*. We have specimens of this bird now before us from Rio, Bahia, Matto Grosso, Eastern Venezuela, and Bogotá, and can find no constant differences amongst them, although there is considerable diversity of tint in the colour of the lower back, and some specimens approach to what Dr. Finsch has recently proposed to call *T. cyanurus* (P. Z. S. 1870, p. 559).

On the other hand three Panama skins (in Mus. S.-G.) present the remarkable character of the outer tail-feathers above mentioned. The first outer pair are all pure white except a narrow basal patch concealed by the tail-coverts. Of the second pair, considerably more than the apical half is white. In the third pair the white apices measure 2 in. in length. When the tail is closed the under surface appears perfectly white. We therefore call this bird *T. chionurus*.

We have seen other examples of this Panama species in Mr. Lawrence's and Mr. Gould's collections.

10. On certain points in the Anatomy and Economy of the Lampreys. By George Gulliver, F.R.S.

Blood-corpuscles.

Red Corpuscles.—For the discovery of the now well-known circular shape of the red blood-corpuscles of the Lamprey, we are indebted to that eminent physiologist Rudolph Wagner. He likened them, as biconcave disks and otherwise, to those of Man and Mammalia; and as his figures and descriptions of those of the Lamprey are the only ones with which I am acquainted, it seems to me that a further account of them is yet desirable.

The majority of them are circular; only a few assume a slightly oval form, just as some circular red disks appear among the far greater number of the regular oval or suboval ones of osseous fishes. The red corpuscles of the Lamprey are but rarely or exceptionally biconcave disks, and then only from irregular or unequal depressions on the surfaces, scarcely ever from those two symmetrical concavities which are so truly characteristic of the blood-disk of Apyrenæmatous vertebrates. On the contrary, the red blood-corpuscles of the Lamprey are regularly either flat or slightly biconvex (fig. 1, *a* and *b*); but this form is liable to much variation from one or more dents caused by puckering or contractions inwards either of the surface or of the margin of the soft disk; often a depression on one side and projection of the other produces a concavo-convex form; and, as a rule, the disk is proportionally and absolutely thicker than that of Apyrenæmatous vertebrates.

The nucleus (fig. 2) is very distinct, either circular or suboval, and sufficiently thick to prevent two such central depressions on the faces of the red corpuscle as would make it a symmetrical biconcave disk.

Hence the comparison of the blood-disks of the Lamprey to

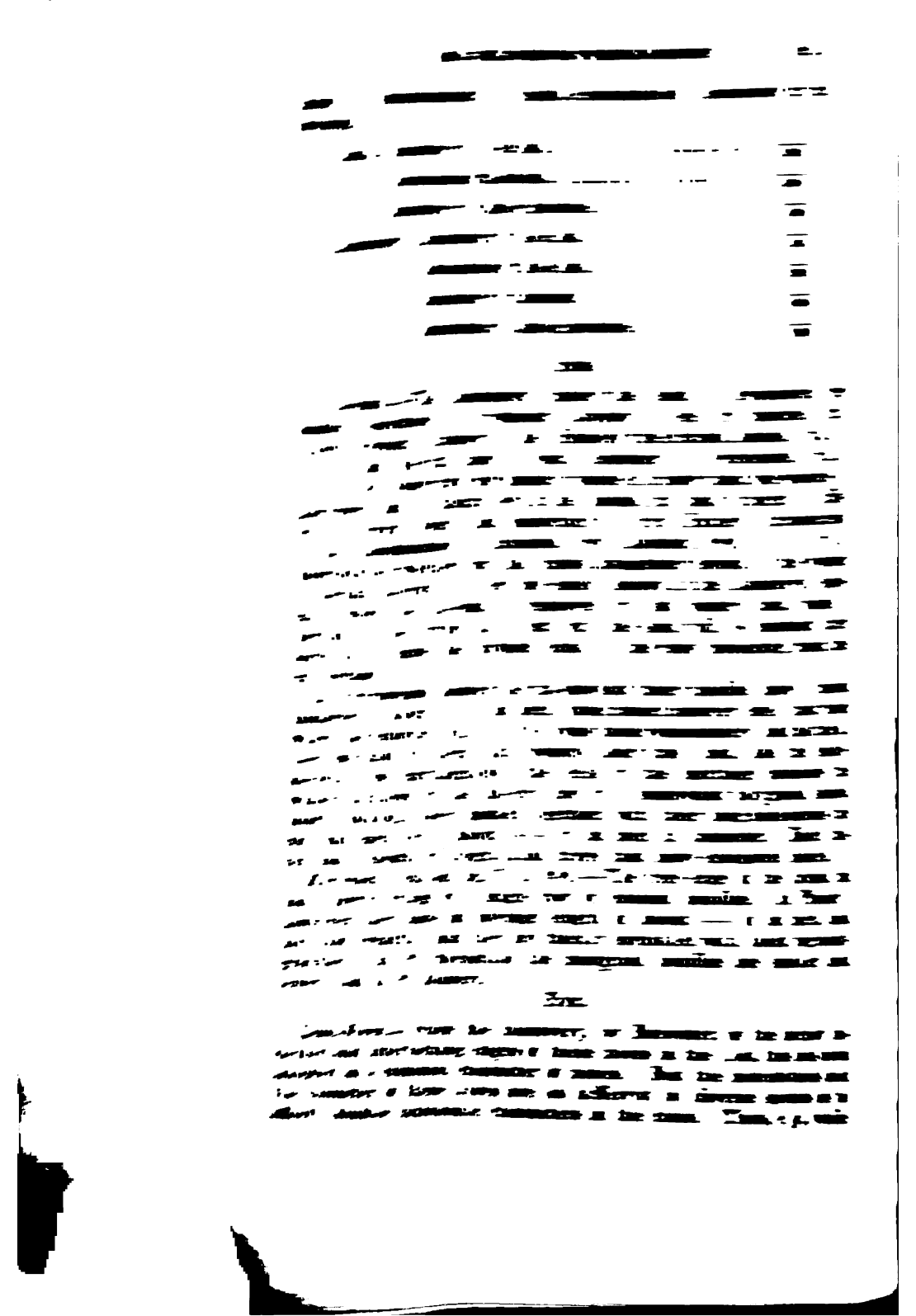
those of Man, so commonly adopted, after Wagner, seems to demand reconsideration. Notwithstanding their correspondence in the circular outline, they differ essentially in structure and size, in which respect the Lamprey's red corpuscle truly conforms to the pyrenæmatous type. No blood-disks of any Apyrenæmatous vertebrate are known to be either regularly nucleated, so large, or so thick as those of the Lamprey; nor is the flat or slightly biconvex form of this fish's blood-disks the regular shape of those of the Apyrenæmata. But though the size may and does, so far as is yet known, thus afford a good diagnostic of existing vertebrates, it does not necessarily follow that Mammalia have never lived with much larger red blood-corpuscles than any ever seen in this class. For, after my proofs that the Edentata are truly characterized by the largeness of these corpuscles (Lecture iii. Med. Times and Gaz. Sept. 13, 1862; Proc. Zool. Soc. Feb. 10, 1870), it seems highly probable that the huge and extinct species of this Aprenæmatous order had blood-disks quite as large as those of the Lamprey.

Pale Globules, fig. 3.—Of this fish these globules are of the same shape, size, and structure so well known in other vertebrates; and hence, while in Apyrenæmata the pale globules are commonly larger than the red corpuscles, in the Lamprey and other Pyrenæmata the pale globules are generally more or less smaller than the red corpuscles.



Of the above woodcut, fig. 1 represents the red corpuscles of *Petromyzon planeri* as seen in the liquor sanguinis—*a*, *b*, corpuscles of regular shape seen edgewise; fig. 2, red corpuscles with their nuclei exposed by the action of sulphurous acid; and fig. 3, pale globules of the blood. They are all drawn, like the engravings referred to in the Proc. Zool. Soc. Feb. 10, 1870, to a scale of which each division stands for one four-thousandth of an English inch.

Size of the Corpuscles.—In the following measurements are given, in vulgar fractions of an English inch, the average dimensions of the corpuscles of the blood of Man and of the Lampreys (*Petromyzon planeri*, *P. fluviatilis*, and *Ammocœtes branchialis*). There is so little difference between the blood-copuscles of these fishes that one description may serve for all three of them. Formerly I accidentally



of *Alosa finta*, *Mugil capito*, and most other osseous fishes the external lens-fibres are so deeply indented as to be well represented in that philosopher's engraving from the Cod, these fibres in the Eel have merely a slight serrature or unevenness at their margins, the jaggedness not more distinct than in the same part of various higher vertebrates, as the English Batrachians, and the Rook and Rat; nor in many cartilaginous fishes is the marginal denticulation of the lens-fibres much more marked, as may be witnessed in *Acipenser sturio*, *Galeus vulgaris*, *Raia microcellata*, and numerous others.

And in the Lamprey even this feeble serrature of the edges of the lens-fibres disappears so completely that they are quite smooth and entire, except a very faint roughness towards the ends of the inner fibres near the poles of the lens. And the kernel of the lens is not so hard, tough, and difficult to be teazed out as in osseous fishes; while in these last the lens-fibres are commonly much broader than those of the Lampreys; as may be seen engraved (Monthly Journ. Microsc. Science, April 1869) from the River-lamprey, the Eel, and the Pike.

Organs of Generation.

External Genital Papillæ, figs. 4 and 5, p. 848.—Some notices of these parts occur in the books of systematic ichthyology. Thus Yarrell says that "the roe, in both sexes, escapes by a small membranous sheath, which has internally at its base five apertures, one leading upwards to the intestine;" and Couch describes, in the Silver Lamprey, "a process which perhaps appears only at the time of the shedding of the spawn, and may be confined to one sex only." Wagner mentions "conical and often elongated structures, resembling intromittent organs, in *Syngnathus*, *Gobius*, *Lepadogaster*, *Blennius*, and also *Petromyzon*;" but as of the genital papillæ and their tubular canal in both sexes of the Lampreys no notice is given either in the 'Cyclopædia of Anatomy,' the 'Comparative Anatomy of Vertebrates,' or Max Schultze's elaborate memoir on *Petromyzon planeri*, I have drawn up the following descriptions from this species.

Penis or Genital Papilla of the Male, fig. 4.—This is very conspicuous during the height of the spawning-season in spring, and when flaccid is about an eighth of an inch long, a thirtieth thick, and of a conical shape. On the 20th of April, my son, while examining dead specimens of this fish under water, found that abundance of semen issued in a jet through the papilla, as from a syringe, when the abdomen was pressed between his thumb and finger; and that this seminal outlet was a central and perfect canal, or longitudinal tube, through which either air or a fine probe could readily be passed from the peritoneal cavity. When the semen was pressed out in a full stream along this canal, the penis was elongated and somewhat distended and erected, like an intromittent part for copulation. The organ has numerous minute blood-vessels, and is composed of a dense connective tissue with numerous connective-tissue corpuscles.

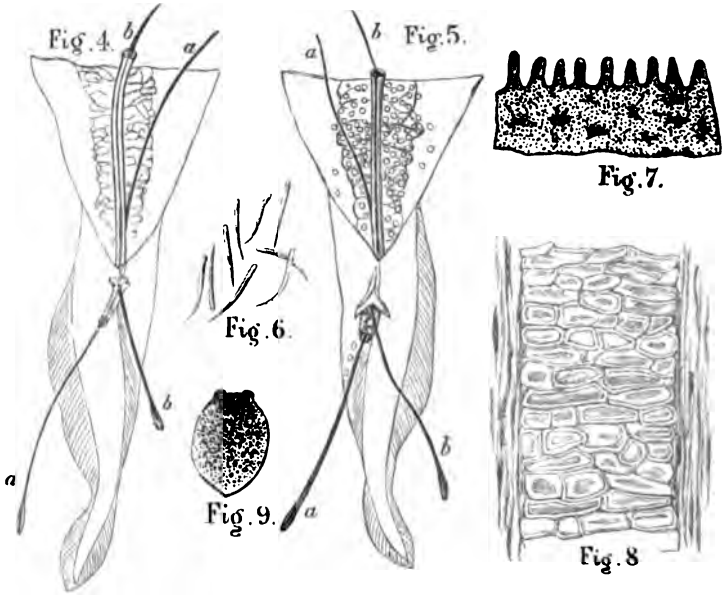
Female Genital Papilla, or Vulva, fig. 5.—At the same time we

saw that those females which were distended with eggs had a similar genital papilla, only shorter and with a wider canal than in the male. Through this vulva the eggs, each about a fortieth of an inch in diameter, readily escaped in single file. The intimate structure of the organ is the same, and the tube a genito-urinal outlet, in both sexes.

From the above descriptions, it appears that during the spawning-season, the peritoneum of the Lamprey is not in either sex a shut sac, for it opens outward by the tubular canal, through and along the centre of the genital papillæ of the male and female—and that in each sex the genital outlet is single, with its external opening independent of and separate from the so-called cloaca.

Spermatic Filaments, fig. 6.—These were extremely abundant. Their mean length is $\frac{1}{2000}$ and their thickness $\frac{1}{30,000}$ of an inch. Though but little acted on by acetic acid, they do not preserve their shape well in drying.

Indeed the effect of this acid seems to indicate different chemical characters of the spermatozoa of different animals. While it has no effect on those filaments of most mammalia, it dissolves or destroys very quickly the spiral spermatozoa of birds; and yet the club-shaped spermatozoa of this class resist its action like those of mammalia, as more particularly noticed in the 'Proceedings' of this Society, July 26, 1842.



In the above woodcut, figs. 4 and 5 show the genital papillæ of the natural size—fig. 4 of the male, and fig. 5 of the female; in each

the bristle *a a* is passed from the peritoneal sac, through the tubular genital outlet which perforates lengthwise the centre of the papilla; the bristle *b b* is passed along the inside of the intestine, and out at the anus. In the female, fig. 5, some ova are seen free in the abdomen, and others passing and passed through the canal of the vulva. Fig. 6, spermatic filaments, magnified about 700 diameters. Fig. 7, marginal papillæ of the dorsal fin, magnified about 75 diameters. Fig. 8, a bit of fin-ray, its cartilage-cells and sheath-fibres, magnified about 600 diameters. Fig. 9, brain-worm, enlarged about 60 diameters. All the figures were taken from Planer's Lamprey.

Abundance of Ova.—The females of Planer's Lamprey are much distended with eggs in the spring. In a specimen of *Petromyzon fluviatilis* caught on the 20th December, 1868, eighteen inches long and six and a half ounces weight, I counted no less than 51,220 eggs, none of which were then detached from the ovary into the peritoneal cavity. Their average diameter was $\frac{1}{80}$ of an inch; and 394 of them, after having been drained of extraneous moisture, weighed one grain.

Petromyzon planeri.

I have seen this species in abundance at Dundrum in the north of Ireland; and it is remarkably plentiful in the river Stour at Canterbury. During the spawning-season, which occurs here from the end of March until June, this Lamprey is so common in the shallow streams, and so intent on the procreative business, as to be taken in numbers by hand, much to the amusement of the idle boys, who indulge then in this simple and primitive sort of piscatorial sport. After June or July, these Lampreys entirely disappear, so that not a single specimen can be found, though the larval Ammocete is then, as before, to be caught. During the height of the spawning-season, Planer's Lamprey takes so little food that none is found in the alimentary canal, which is then contracted to a mere thread, while the Ammocete feeds freely and has its intestine distended accordingly.

Entozoa.

It is remarkable that a fish with its brain-case occupied by a mass of living worms equal to that of the cerebral substance should appear in perfect health and activity, exercising its generative functions with the greatest vigour; yet such is the case with Planer's Lamprey.

In the course of last spring my son was examining the brain of this fish, and found it infested by great numbers of what seemed to belong to the tribe of parasitic "platyelminthes." Of a single fish the entire brain was not larger than the aggregate bulk of the whole of these worms. On pursuing the inquiry, it was found that every Planer's Lamprey taken for us that season from the Stour river at Canterbury was thus infested; not a single specimen examined was exempt from these brain-worms. Their future career and

final destiny might afford important information for helminthology; and the investigation would be easy now we have learned this station and phase of the worm. Hence I have given the sketch (fig. 9, p. 848), and hope soon to examine more fully the anatomy of this entozoon in fresh specimens.

The average length of each worm was $\frac{1}{60}$ of an inch; its shape oval with two projecting papillæ; the integument distinct and composed of two coats, the body filled with pale round corpuscles and many oval ones. There seemed to be a mouth with a feeble current setting into it; but neither hooklets, spines, nor vibratile cilia were visible. The motions by contraction and expansion of the worm were very remarkable; and this evidence of its vitality continued two or three days after the death and putrefaction of its host.

11. On the Myology of *Chamæleon parsonii*.

By St. George Mivart, F.R.S.

The singular modifications of the appendicular skeleton of the Chameleon, and the remarkable resemblances which exist between its pectoral and pelvic portions, naturally suggest that its myology cannot be other than interesting.

An unusually good opportunity of investigating that myology having, through the kindness of my friend Professor Flower, presented itself, I beg to bring before the Society the results of the dissection of a magnificent specimen of the above-named large Chameleon of Madagascar.

AXIAL MUSCLES.

I. Muscles of the Head.

Mylo-hyoideus anterior (figs. 1 and 3, M^1). This muscle forms, as usual, a delicate layer which arises inside the ramus of the mandible, meeting and joining its fellow of the opposite side beneath the throat. Its fibres pass downward and backward; and its posterior portion overlaps and is superficial to the antero-inferior part of the posterior mylo-hyoid.

Mylo-hyoideus posterior (figs. 1 and 3, M^2). A considerable but delicate muscular lamella arises from the inner side of the suspensorium of the mandible, and, passing downwards beneath the throat, meets its fellow of the opposite side. It is immediately superficial to the genio-hyoid, but anteriorly it passes above the anterior mylo-hyoid, so that the fibres of the latter are superficial to it. Posteriorly this muscle gradually loses itself in the delicate fascia investing the muscles of the chest.

Above, this muscle is closely connected with a thin muscular layer which springs from the dense fascia binding down the muscles of the occipital crest, and which ends in the fascia which encloses the levator claviculæ.

A double-bellied muscle (fig. 1, *Z*), which might be called a *superficial temporal*, arises posteriorly from the anterior border of the suspensorium. It here forms a delicate sheet of fibres which converge and are implanted into a tendon which passes beneath the strong zygomatic ligament which connects the posterior margin of the orbit with the lower end of the suspensorium. Anteriorly other muscular fibres spring from the upper border of the mandible, and passing backwards are inserted into the tendon before mentioned.

Temporalis * (fig. 6, *T*). This muscle is of prodigious size; and it would be interesting to know what is the use to the Chameleon of so singularly voluminous a temporal. It springs from the whole surface of the temporal fossa, and from the occipital crest, where it appears on the back of the head, having the most anterior part of the longissimus dorsi on its inner side, and the complexus on its outer side. It is inserted into the upper border of the mandible, between the coronoid process and the articular surface. I did not find any distinct masseter †.

The *depressor mandibulæ* (figs. 1 and 6, *D*), or digastric, arises from the postero-external margin of the singular occipital crest and of the suspensorium. It is inserted into the posterior end of the mandible.

The *pterygoids* ‡ (figs. 1, 3, and 5, *Pt.*) are closely united. The *external pterygoid* is thick and large, arising from the inner side of the much downwardly prolonged pterygoid, and being inserted into the adjacent side of the mandible, between the coronoid process and the angle of the jaw.

The *internal pterygoid* is much smaller, and passes from the outside of the pterygoid to the posterior part of the mandible.

II. Muscles of the Hyoid.

The *genio-hyoid* § (figs. 3, 6, and 7, *G. H.*) arises from the hinder side of the mandible, at and near its symphysis. Passing backward it ends in a delicate fascia (closely connected with the under surface of the basihyal), which also receives the fibres of the sterno-hyoid, the two muscles thus forming a sheet only interrupted by fascia.

The *cerato-mandibular* ‖ (figs. 3, 6, and 7, *C. M.*) arises in common with the last, of which it may be considered a differentiation. It is inserted into the summit of the thyro-hyal or posterior cornu.

Levator arcuum (fig. 7, *A*). A small muscle may perhaps be thus named which springs from the summits of the hyoidean cornua and loses itself in fascia within the lower jaw.

Cerato-hyoideus (fig. 7, *H*). This is a small but thick muscular

* See Cuvier, 'Leçons d'Anat. Comp.' 1835, 2nd edition, tome iv. première partie, p. 137.

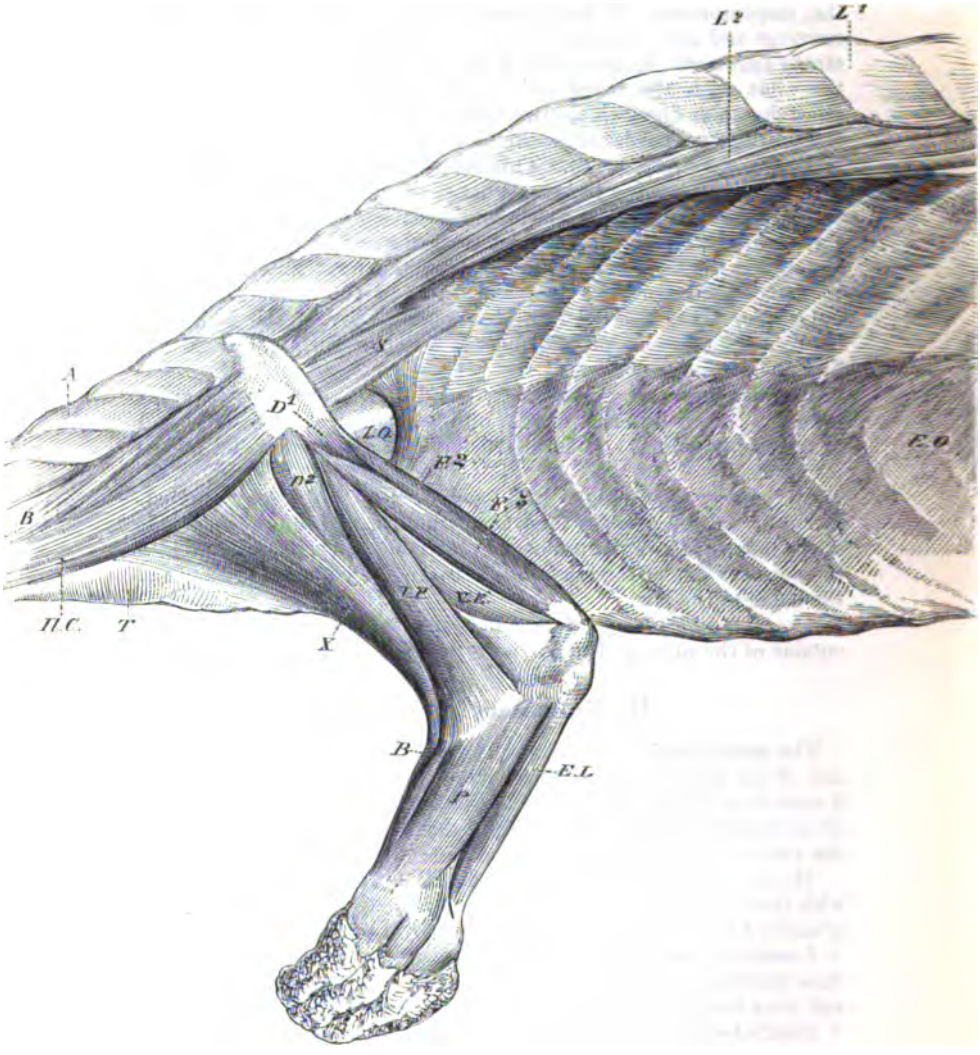
† This agrees with Meckel's observations. Anat. Comp. traduit par Sanson et Schuster, 1838, tome viii. p. 113.

‡ Cuvier, *l. c.* p. 140; Meckel, *l. c.* p. 115.

§ Cuvier, *l. c.* p. 531; Meckel, *l. c.* p. 141.

‖ Cuvier, *l. c.* p. 531; Meckel, *l. c.* p. 141.

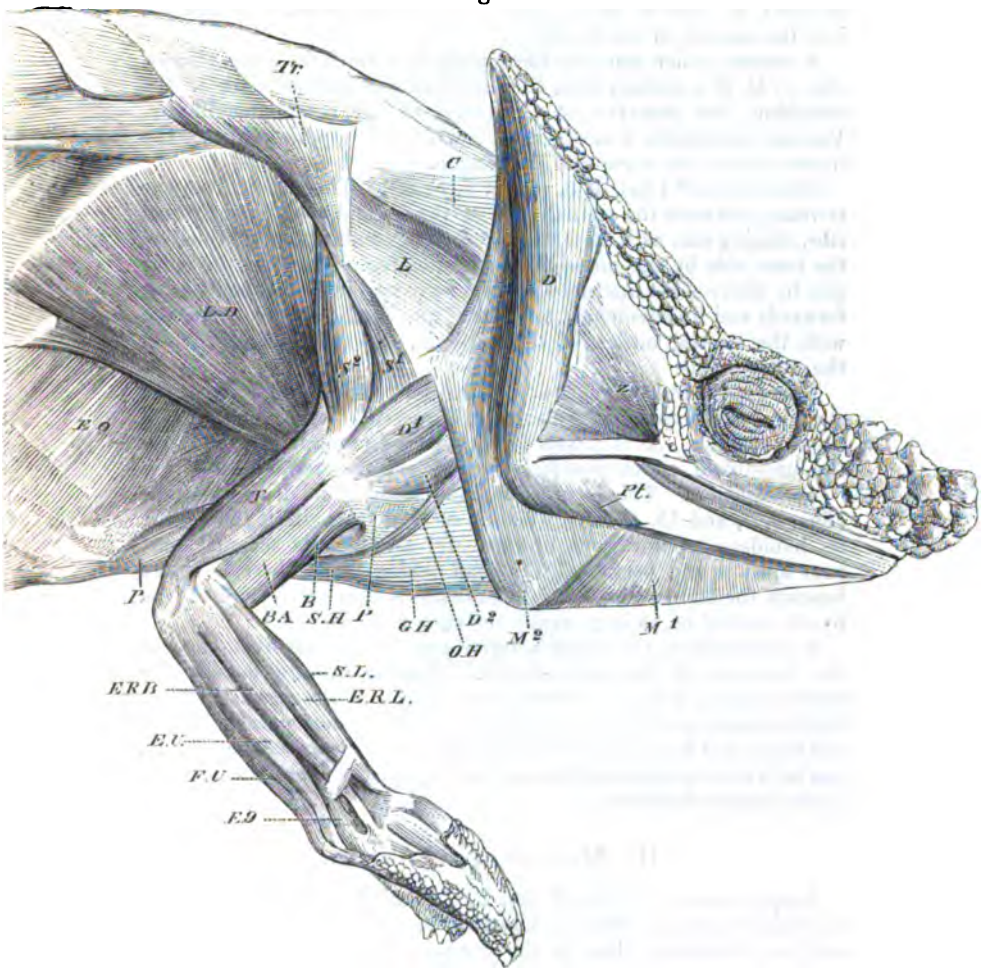
Fig. 2.



Superficial muscles.

A B. Supracaudal. *B.* Biceps femoris. D^1. Gluteus primus. D^2. Gluteus secundus. *E. L.* Extensor longus digitorum. *E. O.* External oblique. F^{12}, F^{13}. Rectus femoris. *H. C.* Ilio-caudal. *I. O.* Internal oblique. *I. P.* Ilio-peroneal. L^1, L^2. Longissimus dorsi. *P.* Peroneus. *S.* Sacro-lumbalis. *T.* Transversus perinei. *V. E.* Vastus externus. *X.* Gluteus maximus.

Fig. 1.



Superficial muscles.

B. Biceps. *B.A.* Brachialis anticus. *C.* Complexus. *D.* Digastric. D^1, D^2. Deltoid. E^9. Small extensor 9. *E. O.* External oblique. *E. R. B.* Extensor radialis brevior. *E. R. L.* Extensor radialis longior. *E. U.* Extensor ulnaris. *F. U.* Flexor ulnaris. *G. H.* Genio-hyoid. *L.* Levator claviculæ. *L. D.* Latissimus dorsi. M^1. Mylo-hyoid anterior. M^2. Mylo-hyoid posterior. *O. H.* Omo-hyoid. *P.* Pectoralis. *Pt.* Pterygoid. S^1, S^2. Suprascapulars. *S. H.* Sterno-hyoid. *S. L.* Supinator longus. *T.* Triceps. *Tr.* Trapezius. *Z.* Superficial temporal.

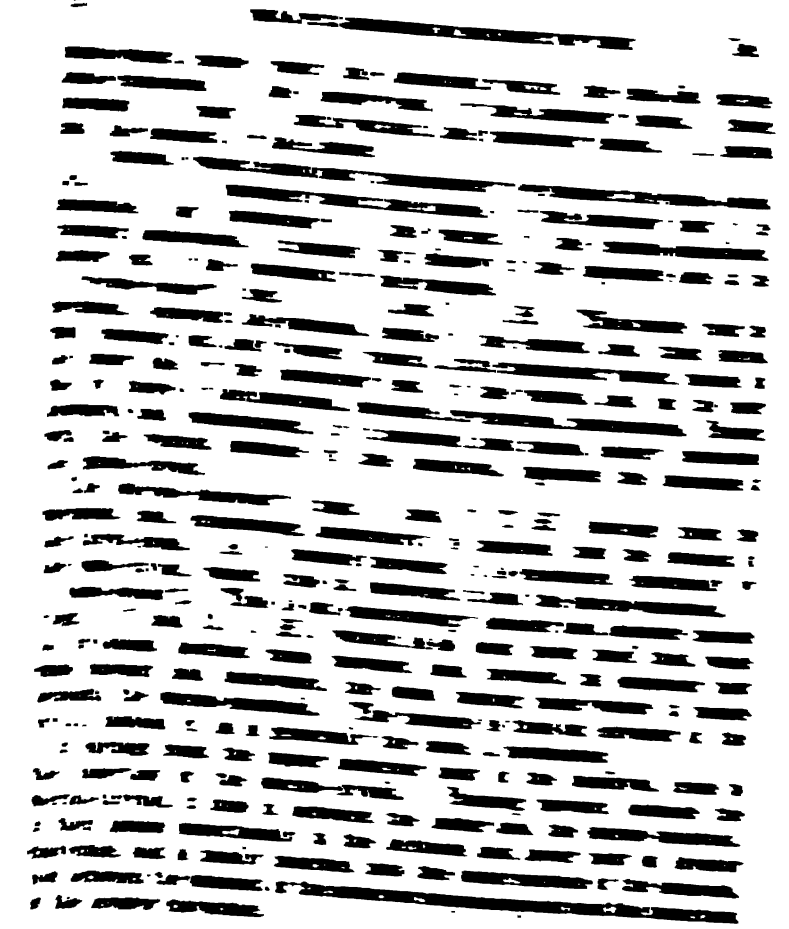
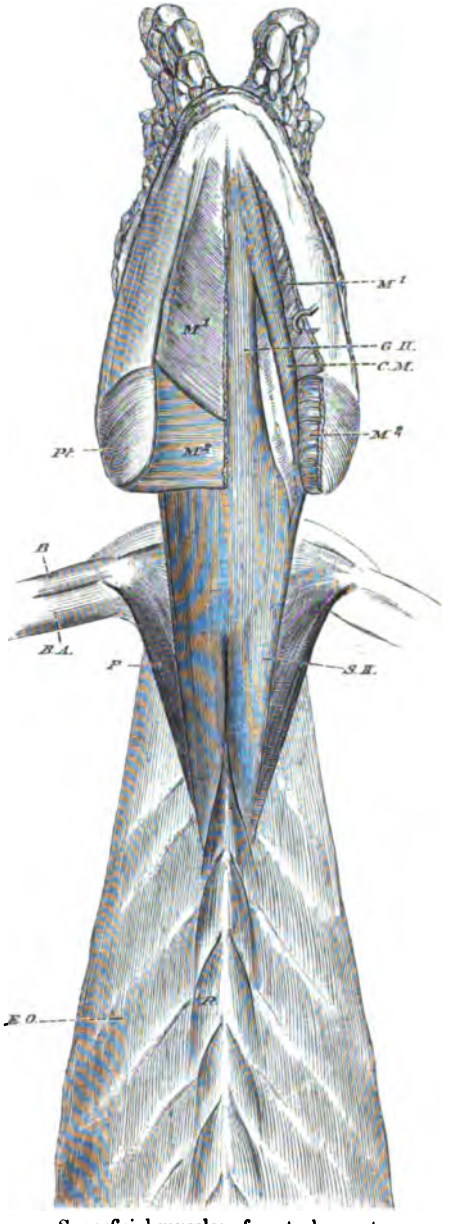


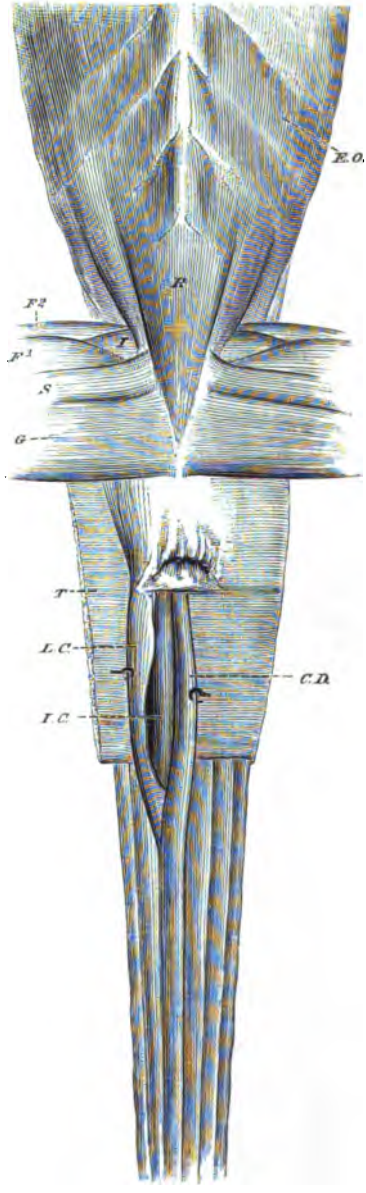
Fig. 3.



Superficial muscles of ventral aspect.

B. Biceps. *B.A.* Brachialis anticus. *C.M.* Cerato-mandibular. *E.O.* External oblique. *G.H.* Genio-hyoid. *M*¹. Mylo-hyoid anterior. *M*². Mylo-hyoid posterior. *P.* Pectoralis. *Pt.* Pterygoid. *R.* Rectus. *S.H.* Sterno-hyoid.

Fig. 4.



Superficial muscles of ventral aspect on the right side. On the left the transversus perinei is cut and reflected, and the ischio-caudal shown by the separation of the adjacent muscles.

C. D. Infero-caudal. *E. O.* External oblique. *F*¹, *F*². Rectus femoris. *G.* Gracilis. *I.* Iliacus. *I. C.* Ischio-caudal. *L. C.* Cloacal muscle. *R.* Rectus. *S.* Tibial adductor. *T.* Transversus perinei.

The upper part (L^1) occupies the groove between the neural spines and the zygapophyses. It is bound down by a dense tendinous fascia, and shows tendinous thickenings passing downward and slightly forward, from the summits of the spines to the articular processes.

The lower part (L^2) occupies the groove between the zygapophyses and the transverse processes, and consists of a number of cones, with the muscular apices posterior and the tendinous aponeuroses anterior. Thus the muscle on being cut exhibits a number of aponeurotic layers placed one within the other, and shows externally tendinous thickenings, passing backward and very slightly downward, from the zygapophyses to the ends of the transverse processes.

Complexus major. This is merely the most anterior portion of the upper part of the longissimus dorsi. Passing to the back of the skull, internal to the postero-superior part of the temporal, it is deeply inserted into the side of the cranium, beneath the projecting occipital crest.

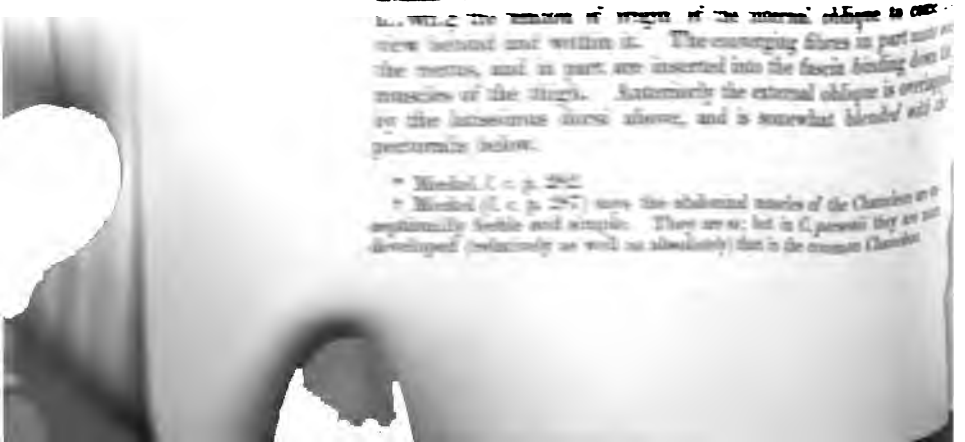
The *complexus minor* (figs. 1, 6, and 7, *C*) is the most anterior

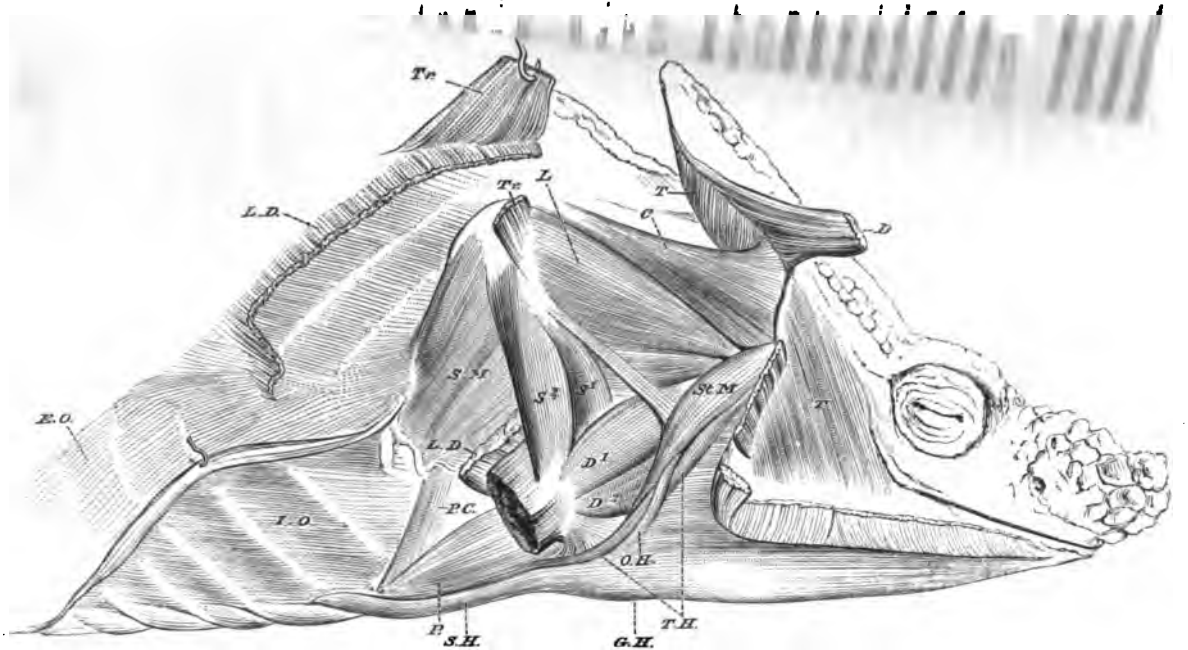
Fig. 5.



Deepest muscles of ventral aspect of neck.

L. Levator claviculæ. *Pt.* Pterygoid. *R.A* Rectus anticus. *Sc.* Scalenus. *S.M.* Sterno-mastoid.





Deeper muscles of right side; the right arm cut off below the shoulder-joint.

C. Complexus. *D.* Digastric. D^1. Deltoid. *E. O.* External oblique. *G. H.* Genio-hyoid. *I. O.* Internal oblique. *L.* Levator claviculæ. *L. D.* Latissimus dorsi. *O. H.* Omo-hyoid. *P.* Pectoralis. *P. C.* Supracostalis. S^1, S^2. Suprascapulars. *S. H.* Sterno-hyoid. *S. M.* Serratus magnus. *St. M.* Sterno-mastoid. *T.* Temporalis. *Tr.* Trapezius. *T. H.* Sterno-thyroid.

portion of the lower part of the longissimus dorsi. Diverging outward it is implanted into the postero-internal aspect of the suspensorium, and into the back of the skull. At its insertion this muscle has the postero-superior part of the temporal at its inner side, and the upper part of the depressor mandibulæ at its outer side. It is also implanted above and internal to the attachment of the sterno-mastoid.

Sacro-lumbalis (fig. 2, *S*). This muscle arises from the dense fibrous tissue in which the ilium is more or less imbedded. Thence its fibres pass forward, being conterminous below with the origin of the external oblique, and conterminous above with the inferior margin of the lower part of the longissimus dorsi. Anteriorly this muscle becomes very indistinct, being with difficulty separable from the similarly directed fibres of the external intercostals. Passing forward beneath the latissimus dorsi, the trapezius, and the levator claviculæ, it ends by constituting the muscle next described.

Cervicalis ascendens (fig. 7, *C. A*). This is the continuation forward of the sacro-lumbalis. It is connected with the ribs and transverse processes of the more anterior vertebræ, and is inserted into the atlas.

Scalenus (figs. 5 and 7, *Sc.*). This lies immediately on the ventral side of the cervicalis ascendens. It arises from the side of the atlas, and, passing backward between the complexus minor and rectus anticus, is inserted into the first rib which is elongated but does not reach the sternum.

The *sterno-mastoid* * (fig. 5, *S. M*, and figs. 6 and 7, *St. M*) is short, and is directed strongly upward as well as forward. It arises from the antero-external part of the coracoid groove of the sternum, and is inserted into the postero-internal aspect of the suspensorium. It is in close proximity to the sterno-thyroid; but the narrow omo-hyoid passes between.

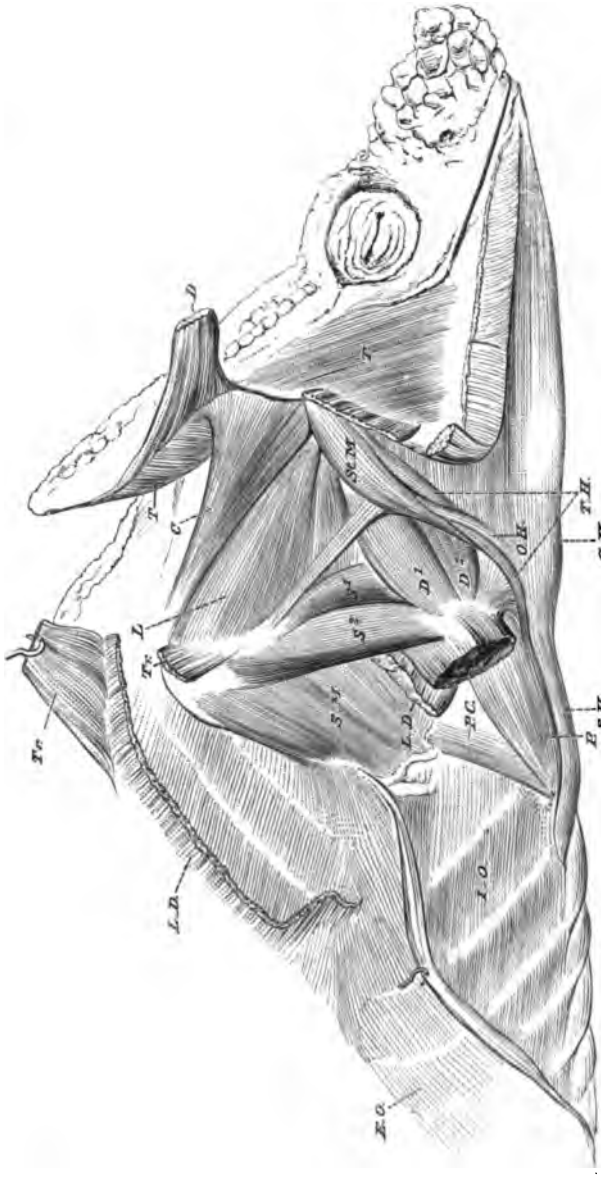
External oblique † (figs. 1, 4, 5, 6, and 7, *E. O*). This muscle is not largely developed. It arises by delicate fascia from the outside of the ribs (beginning with the first elongated one), at the line of fascia which bounds infero-externally the sacro-lumbalis. Anteriorly the origin of the muscle is less than half an inch above the angles of the ribs; posteriorly it is more than half an inch above them.

The muscular fibres do not nearly reach the inferior middle line of the body, but end in a delicate aponeurosis. Posteriorly this muscle ends in a well-marked border (concave backwards), thus allowing the tendon of origin of the internal oblique to come into view behind and within it. The converging fibres in part unite with the rectus, and in part are inserted into the fascia binding down the muscles of the thigh. Anteriorly the external oblique is overlapped by the latissimus dorsi above, and is somewhat blended with the pectoralis below.

* Meckel, *l. c.* p. 282.

† Meckel (*l. c.* p. 287) says the abdominal muscles of the Chameleon are exceptionally feeble and simple. They are so; but in *C. parsonii* they are more developed (relatively as well as absolutely) than in the common Chameleon.

Fig. 6.



Deeper muscles of right side; the right arm cut off below the shoulder-joint.

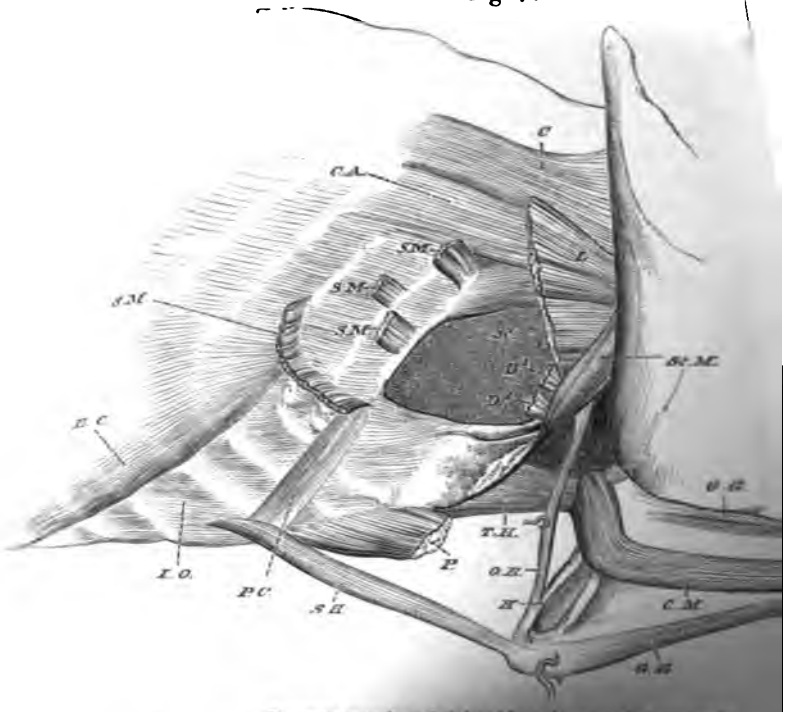
C. Complexus. *D.* Digastric. D^1. Deltoid. *E. O.* External oblique. *G. H.* Genio-hyoid. *I. O.* Internal oblique. *L.* Levator clavicularum. *L. D.* Latissimus dorsi. *O. H.* Omo-hyoid. *P.* Pectoralis. *P. C.* Supracostalis. S^1, S^2. Supracapulars. *S. H.* Sterno-hyoid. *S. M.* Serratus magnus. *St. M.* Sterno-mastoid. *T.* Temporalis. *Tr.* Trapezius. *T. H.* Sterno-thyroid.

The *internal oblique* (figs. 2, 6, and 7, *I. O*) arises by strong tendon from the anterior margin of the ilium; then ting, it passes upward beneath the sacro-lumbalis to the transverse processes, and there, as well as downward and it is undistinguishable from the external intercostals, and tinues fleshy to the ventral middle line.

From its origin, it is more or less separable into a dorsal ventral portion. The dorsal part somewhat resembles a q lumborum, except that it is on the dorsal side of the tra fascia.

Transversalis. This muscle arises as a very delicate fas tending downward, inside the body-wall, from the dorsal Its fibres seem to form the internal intercostals, the ab nerves passing between this layer and the internal oblique.

Fig. 7.



Deepest muscles of right side; the scapula removed.

C. Complexus. *C.A.* Cervicalis ascendens. *C.M.* Cervico-mastoid. *D*[1]. Deltoid. *E.O.* External oblique. *G.H.* Genio-hyoid. *G.* glossus? *H.* Cerato-hyoideus. *I.O.* Internal oblique. *L.* Le culæ. *O.H.* Omo-hy *P.C.* Supraco lenus. *S.H.* Sterno toid. *T.H.* Sterno

External intercostals. These muscles seem to be formed by the internal oblique, from which they are undistinguishable.

The *internal intercostals* are formed, as above said, by the transversalis.

Rectus * (figs. 3 and 4, *R*). This muscle is interrupted by the ventral ribs, which its several portions connect together. Considered as one whole, it springs from the pubic symphysis, and is inserted anteriorly into the posterior margin of the sternum, its anterior end being enclosed between the posterior origins of the two sterno-hyoids.

The parts between the ventral ribs are with difficulty separable from the internal oblique, so that they might be regarded as thickened fasciculi of the mid-ventral portion of that muscle.

The *rectus anticus* (fig. 5, *R. A*) is the only subvertebral muscle, there being no retrahentes costarum. It springs from the ventral aspect of the bodies of about the first 8 or 9 vertebræ, and it is inserted into the side of the occipital part of the basis cranii.

Supracostalis (figs. 6 and 7, *P. C*). This is a fleshy band which passes upward and forward from the third sternal rib to the first elongated rib, which is in front of the first sternal rib. At its insertion it is conterminous with the most ventral part of the origin of the serratus magnus.

The *sterno-hyoid* and *sterno-thyroid* have been noticed amongst the muscles of the hyoid.

The *pectoralis, latissimus dorsi,* and *sterno-coracoid* will be described amongst the appendicular muscles.

IV. Muscles of the Tail.

Supracaudal. The muscles which occupy the upper half of the caudal surface are the direct continuations backward of the longissimus dorsi. The continuation is direct, because the ilium does not divide them, but is superficial to them.

The upper part (figs. 2 and 27, *A*) occupies the groove between the spines and zygapophyses, like the upper part of the longissimus dorsi.

The lower part (figs. 2 and 27, *B*) occupies the groove between the zygapophyses and the transverse processes, like the lower part of the longissimus dorsi. These muscles are continued to the end of the tail.

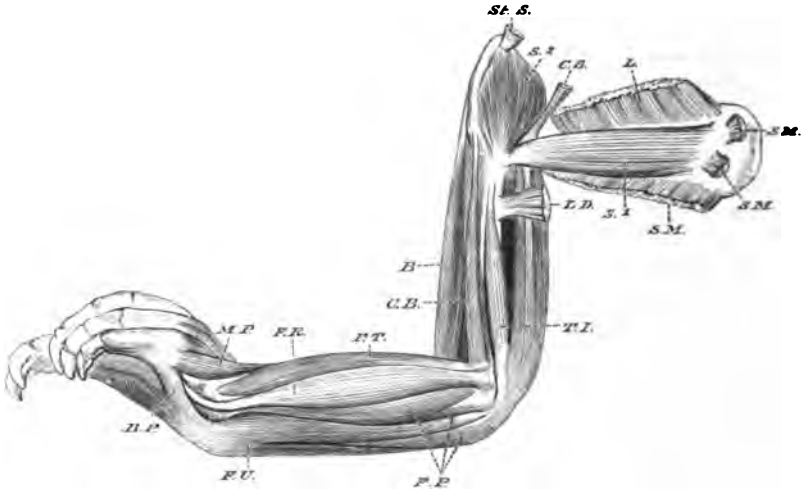
The *ilio-caudal* (figs. 2 and 27, *Il. C*) seems to more or less continue backward the sacro-lumbalis, though it is not uninterruptedly connected with it, but springs from the sacro-iliac attachment and the hinder side of the sacral transverse process. It runs backward above, below, and between the caudal transverse processes, and is indistinctly subdivisible into two or more longitudinal muscles. It seems to answer to the ilio-caudal of the *Urodela*†. It runs

* Meckel, *l. c.* p. 287.

† See P. Z. S. 1869, pp. 268 and 463.

backward to the end of the tail, and, except toward the root of that organ, forms fully half of each lateral caudal mass.

Fig. 8.



Inner side of right pectoral limb.

B. Biceps. *B. P.* Flexor brevis pollicis. *C. B.* Coraco-brachialis. *C. S.* Costo-coracoid ligament. *F. P.* Flexor longus pollicis. *F. R.* Flexor radialis. *F. U.* Flexor ulnaris. *L.* Levator claviculæ. *L. D.* Latissimus dorsi. *M. P.* Extensor metacarpi pollicis. *P. T.* Pronator teres. S^1, S^2. Subscapularis. *S. M.* Serratus magnus. *St. S.* Sterno-coracoid. *T. I.* Internal part of triceps.

Transversus perinei (figs. 4 and 27, *T*). A muscle may perhaps be thus named which meets its fellow of the opposite side in the subcaudal middle line, behind the cloacal opening. Anteriorly it blends with what I provisionally distinguish as the gluteus maximus; posteriorly it loses itself in a delicate fascia enclosing the infero-caudal.

Infero-caudal (figs. 4 and 27, *C. D*). This muscle runs along the middle of the under surface of the tail for its whole length, passing, anteriorly, above the transversus perinei, and beside the cloacal aperture internal to the ischio-caudal. It ends on the postero-external wall of the cloaca.

The *ischio-caudal* (figs. 4 and 27, *I. C*) springs from the under part of the postsacral caudal vertebræ (from about the fourth to the twelfth), side by side with its fellow of the opposite side of the tail. Passing forward within the *cloacal muscle*, it is inserted into the tuberosity of the ischium.

The *cloacal muscle* (figs. 4 and 27, *L. C*) arises from beneath the tail, about the twelfth postsacral vertebra. It passes forward

above the infero-caudal, outside the ischio-caudal, but within the lateral caudal. It is inserted into the hinder lip of the cloaca.

The *femoro-caudal* will be described amongst the muscles of the pelvic limb.

Fig. 9.



Radial side of right arm.

A^3. Adductor digiti tertii. A^4. Adductor digiti quarti. *B*. Biceps. B^1, B^2, B^3. Extensores phalangorum. E^3, E^4, E^5. Extensores metacarporum. *E. R. L.* Extensor radialis longior. *F. R.* Flexor radialis. *M. P.* Extensor metacarpi pollicis. *P. T.* Pronator teres. *S. L.* Supinator longus.

APPENDICULAR MUSCLES.

I. Muscles of the Pectoral Limb.

*Pectoralis** (figs. 1, 3, and 13, *P*). This rather narrow but fleshy muscle arises from the sternum (partly within but mostly behind the origin of the sterno-mastoid), from the third sternal rib, and from the fascia of the external oblique. It is inserted into the anterior aspect of the radial tuberosity of the humerus, just external to the tendon of the biceps. Its most anterior part is superficial to the infero-median portion of the subclavius or epicoraco-humeral.

The *trapezius*† (figs. 1, 6, 13, *Tr.*) is an exceedingly small muscle, which arises from a strong fascia attached to the neural spines, from about the fifth to the seventh. Narrowing downward,

* Meckel, *l. c.* p. 344.

† Meckel, *l. c.* p. 310.

it is inserted into the anterior part of the outer surface of the scapula, near its summit, between the insertions of the levator claviculæ and posterior suprascapular.

Latissimus dorsi (figs. 1, 6, 8, *L. D*). This rather large muscular sheet springs from the strong fascia which binds down the erector spinæ, and from the vertebral portions of the third and fourth of those ribs which extend to the sternum. Its origin extends forward beneath the trapezius, which thus overlaps it. It is inserted into the ulnar side of the upper part of the humerus, a little distance below the insertion of the subscapularis. No tendon passes down on its inner side, as it does in the *Iguana*.

Serratus magnus * (figs. 6, 7, 8, & 13, *S. M*). This is much divided, consisting of one large and three smaller portions. The first springs from about the angles of the first three ribs which join the sternum, and is inserted into the posterior margin of the scapula. The other three parts spring, two from the first rib, and one from the second, above their angles, and are inserted into the inner side of the upper part of the scapula and into its posterior margin.

Anterior suprascapular (figs. 1, 6, & 13, S^1). A muscle which may perhaps be conveniently thus distinguished springs from the anterior part of the outside of the scapula, and is strongly inserted outside the head of the humerus, behind the subclavius, and in front of the insertion of the deltoid. It has the levator claviculæ and omo-hyoid in front, the posterior suprascapular behind.

The *posterior suprascapular* † (figs. 1, 6, 13, S^2) is a thick fleshy muscle, which arises from the posterior part of the outer side of the scapula, and is inserted into the humerus just above (behind when the humerus is vertical) the insertion of the deltoid.

The *deltoid* appears to consist of two parts. The upper or posterior portion (figs. 1, 6, 7, & 13, D^1) arises from the inner end of the ventral margin of the coracoid groove of the sternum, just external to the origin of the second part of the deltoid, and internal to and overlapped by the sterno-mastoid. Some fibres arise from the spur of the epicoracoid. Passing down superficially to the subclavius, it is inserted into the head of the humerus, between the insertions of the pectoralis and of the second part of the suprascapular.

The second, lower or anterior part of the deltoid (figs. 1, 6, 7, & 13, D^2) arises from the innermost part of the ventral margin of the coracoid groove of the sternum, just within the origin of the first part of the deltoid. It is inserted into the humerus above the summit of the brachialis anticus, and on the antero-inferior side of the insertion of the first part of the deltoid. It is superficial to part of the subclavius; and its antero-inferior margin is conterminous with the upper border of the most anterior part of the pectoralis.

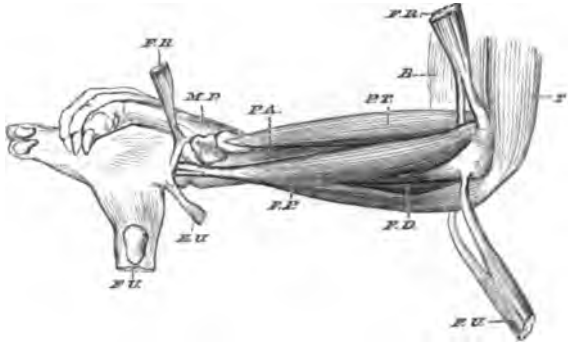
Omo-hyoid. This muscle has been described amongst the others which belong to the hyoid.

Subscapularis (fig. 8, S^1 & S^2). This large muscle consists of two distinct parts. One arises from the whole costal surface of the ossified part of the scapula, between the insertions of the levator clavi-

* Meckel, *l. c.* p. 313. † Meckel, *l. c.* p. 342.

culæ and serratus magnus. The other part arises from the whole inner surface of the coracoid. Both parts have a common insertion into the ulnar tuberosity, which is close to the head of the humerus.

Fig. 10.



Deeper muscles of flexor aspect of right forearm, the flexor ulnaris and flexor radialis being cut and reflected.

B. Biceps. *E. U.* Extensor ulnaris. *F. D.* Flexor profundus digitorum. *F. P.* Flexor longus pollicis. *F. R.* Flexor radialis. *F. U.* Flexor ulnaris. *M. P.* Extensor metacarpi pollicis. *P. A.* Pronator accessorius. *P. T.* Pronator teres. *T.* Triceps.

Sterno-coracoid (fig. 8, *St. S*). A muscle, as in the Iguana, takes origin from the inside of the sternum, and is inserted, very strongly, into the antero-internal angle of the inner surface of the precoracoid, just external to its articulation with the sternum.

A dense membrane is attached, on the one hand, to the anterior margin of the first rib, on the other hand into the angle of the anterior margin of the shoulder-girdle, between the two parts (fig. 8, *C. S*) of the subscapularis. This sheet of membrane appears to represent the *costo-coracoid* muscle of the Iguana.

The *levator claviculæ* (figs. 1, 5, 6, 7, 8, 13, *L*) is a very voluminous and more or less double mass. It arises from the basioccipital, and is inserted into the anterior margin of the scapula, overlapped by the omo-hyoid, and conterminous behind with the suprascapular.

Subclavius (fig. 13, *S. C*). This muscle, which I before named * epicoraco-humeral, but which Professor Rolleston considers to be the subclavius, springs from the whole anterior border of the coraco-epicoracoid. Passing downward and backward beneath the deltoid, it is inserted into the great tuberosity of the humerus, immediately in front of (above, the humerus being vertical) the insertion of the pectoralis, which muscle is superficial to it. The subclavius itself is superficial to the antero-external part of the short coraco-brachialis, with which (especially toward its hinder part) it is closely connected.

* P. Z. S. 1867, p. 778.

Fig. 11.



Deeper muscles of extensor aspect of right forearm, the extensores radiales longior and brevior being cut and reflected.

B. Biceps. E^4–E^9. Extensores metacarporum. *E. R. B.* Extensor radialis brevior. *E. R. L.* Extensor radialis longior. *E. U.* Extensor ulnaris. *F. U.* Flexor ulnaris. *M. P.* Extensor ossis metacarpi pollicis. *P. Q.* Pronator quadratus. *S. L.* Supinator longus. *T.* Triceps.

Coraco-brachialis * (fig. 8, *C. B*). This muscle consists of two parts :—

1. The first of these, or shorter portion, is a broad muscle like that of the Iguana. It arises, by muscular fibres, from the whole outer surface of the coracoid. It is inserted into the radial tuberosity of the humerus, and into about the upper two-fifths of the shaft of that bone, ending below in a point which extends between the innermost origin of the brachialis anticus and the most antero-external origin of the external part of the triceps.

2. The second, longer portion, arises by a strong but rather delicate tendon from the outer margin of the posterior end of the sternal groove of the coracoid. Long and slender, it passes downward, and is inserted, by muscular fibres, into the internal condyle.

Triceps † (figs. 1, 8, 10, 11, & 13, *T*, *TI*, T^2). This muscle only consists of three parts; and the second and third of these are very closely united.

* Meckel, *l. c.* p. 346.

† Meckel, *l. c.* p. 365.

Fig. 12.



Deepest muscles of extensor surface of right forearm.
M. P. Extensor metacarpi pollicis. *P. A.* Pronator accessorius. *P. Q.* Pronator quadratus. *S. L.* Supinator longus.

1. The first part (fig. 13, *T*) arises from the axillary margin of the scapula, just behind (when the humerus is horizontal, above) the glenoid surface. This answers to both of the first two parts (external and internal long heads) of the triceps of the Iguana; and a strong tendon on its inner surface indicates the part answering to the internal long head of that muscle in the last-named animal.

2. The second part arises from the whole posterior surface of the humerus and part of its outer and inner surfaces. Its origin extends upward (the humerus being placed vertically) to just below the head of the bone, and above the insertion of the second part of the deltoid. Inwardly it extends to just behind the insertion of the latissimus dorsi. Externally (fig. 13, T^2) it reaches the posterior border of the brachialis anticus.

3. The third part (fig. 8, *T. I*) is much the smallest, and is closely connected with the second part. It springs from the inside of the humerus, its origin rising to the level of the upper limit of the insertion of the *latissimus dorsi*.

These three parts unite together, and are inserted in common into the proximal end of the ulna, a large sesamoid ossicle being situated, behind the elbow, in the tendon of insertion.

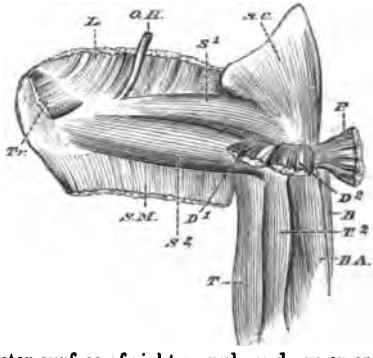
The *biceps* (figs. 1, 8, 9, 10, 11, 13, 15, & 16, *B*) has a single origin, by a long and strong tendon, from the coracoid, just external to its sternal groove. This tendon is at first covered by fibres of the subclavius, and then passes over the short coraco-brachialis. Descending in front of the insertion of the pectoralis, it there becomes fleshy, and becomes more or less divisible into two bellies, which embrace the brachialis anticus in front, but leave part of the latter visible within and without the arm. It ends in two tendons, one for each belly (fig. 16, *B*), which, by their divergence, expose the brachialis anticus in the middle of the lower part of the upper arm. One of these tendons is inserted into the ulnar side of the front aspect of the radius, at the place of the tubercle; the other is inserted into the ulna, in front of its articular surface for the humerus.

The *brachialis anticus* (figs. 1, 13, 16, *B. A*) occupies the whole antero-external aspect of the humerus, extending upward as far as the insertion of the deltoid. On its outer side it has the external head of the triceps; and on its inner side it has the biceps, the short part of the coraco-brachialis, and the insertion of the pectoralis. Passing downward (and much uniting on its ulnar side with the biceps, which wraps it round anteriorly) it is inserted into the flexor surface of the ulna, just below its articular surface for the humerus, and between the tendons of insertion of the biceps. Its insertion is conterminous (fig. 16) with the upper part of the ulnar origin of the flexor longus digitorum.

Supinator longus * (figs. 1, 9, 11, & 15, *S. L*). This muscle is very large, but not so distinctly double as in the Iguana. Its more superficial portion arises from the external condyle, and is inserted into the outer side of the radius for almost its whole length. Its deeper portion springs from quite the lower end of the humerus, external to its articulation with the radius. It is inserted into the upper half of the extensor surface of the radius.

The superficial part is closely connected, toward and at its origin, with the extensor carpi radialis longior, but is separated from it distally by the extensor ossis metacarpi pollicis. Ulnad it is conterminous with the insertion of the pronator teres. The deeper part is not only intimately united with the extensor carpi radialis longior, which covers it, but also with the long part of the extensor ossis metacarpi pollicis.

Fig. 13.



Outer surface of right scapula and upper arm.

B. Biceps. *B. A*. Brachialis anticus. D^1 & D^2. Deltoid. *L*. Levator clavi-culæ. *O. H*. Omo-hyoid. *P*. Pectoralis. S^1 & S^2. Suprascapulars. *S. C*. Subclavius. *S. M*. Serratus magnus. *T*. & T^2. Triceps. *Tr*. Trapezius.

Extensor carpi radialis longior † (figs. 1, 9, & 11, *E. R. L*). This muscle arises by tendinous fibres from the outer surface of the external condyle superficially to the long portion of the supinator longus,

* Meckel, *l. c.* p. 367. † Meckel, *l. c.* p. 381.

with which, for some distance, it is very intimately connected. Passing distad, and quite separating from the extensor carpi radialis brevior, it is inserted into the distal part of the dorsum of the third metacarpal bone.

The *extensor carpi radialis brevior* (figs. 1 & 11, *E. R. B*) arises from the lower end of the external condyle, and from the humerus, quite close to the articular surface for the radius, and outside the origin of the deeper part of the supinator longus, with which, for some distance, it is intimately connected. Passing distad, and diverging from the extensor carpi radialis longior, it passes under a very strong tendinous arch (which extends from the lower end of the ulna to the radius), and is inserted into the ulnar side of the distal part of the dorsum of the fourth metacarpal.

Extensor carpi ulnaris * (figs. 1, 10, & 11, *E. U*). This arises by a tendon which is common to it and to the larger (or radial) portion of the flexor carpi ulnaris. This tendon is attached (beneath the tendon of insertion of the triceps) to the back of the humerus, almost at its distal extremity. The muscle ends distally in a strong tendon, which, dipping down beneath that of the flexor carpi ulnaris, is inserted into the proximal part of the palmar surface of the fifth metacarpal and of its externally projecting process.

Pronator teres † (figs. 8, 9, 10, 14, & 15, *P. T*). The round pronator is very large, and arises by a strong tendon from the internal condyle, close to the insertion of the long part of the coraco-brachialis. It is inserted into about the lower four-fifths of the radius, toward its outer border.

The *flexor carpi radialis* (figs. 8, 9, 10, & 14, *F. R*) has a double origin. One tendon is from the internal condyle immediately below the origin of the pronator teres. The other tendon of origin springs from near the same spot as the first, but separated from it by the summit of part of the flexor profundus digitorum, which is thus embraced between these two tendons. The inner tendon is also much connected with the capsule of the joint between the humerus and ulna, so that it has the appearance of bifurcating. The muscle ends below in a strong tendon, which, passing down, with the flexor sublimis of the palm superficial to it, is inserted into the proximal end of the palmar surface of the first metacarpal, and thence runs on to the same part of the fifth metacarpal, thus constituting a palmar arch, beneath which the long flexor tendons run.

Pronator accessorius (figs. 10, 12, 14, 15, & 16, *P. A*). A thick muscle, which seems to answer to the muscle I have thus named in the Iguana ‡, arises from the internal condyle, immediately beneath and within the humeral origin of the flexor profundus digitorum. It also arises from the radial border of the ulna and from the interosseous ligament, coming into view, when the deepest layer of the extensor surface is exposed (fig. 12), above the short pronator quadratus. It is inserted into rather more than the lower two-thirds of the flexor aspect of the radius (between the insertions of the pronator teres and

* Meckel, *l. c.* p. 383.

† Meckel, *l. c.* p. 368.

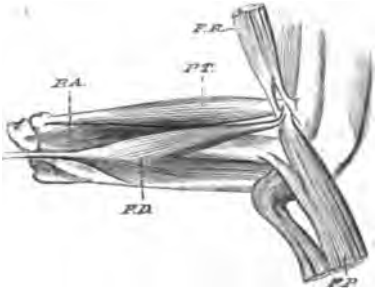
‡ See P. Z. S. 1867, p. 784.

the pronator quadratus), and into the radial carpal ossicle, into which are especially inserted the fibres from the interosseous ligament.

*Pronator quadratus** (figs. 12 & 15, *P. Q*). This is small, and confined to the lower part of the forearm. It springs from the radial aspect of the ulna and from the lower part of its flexor surface, with the pronator accessorius superficial to it on the flexor aspect of the arm. It is inserted into the flexor aspect of the radius for about its distal fourth, but it does not go to the radial ossicle. It is altogether a transverse layer running directly from the ulna to the radius.

Flexor carpi ulnaris (figs. 1, 8, 10, & 11, *F. U*). This muscle is much more distinct from the flexor carpi *radialis* than it is in the Iguana. It has a double origin—one from the internal condyle, the other (by a tendon common to it and the extensor carpi ulnaris) from the lower end of the back of the humerus. Passing downward, the two parts unite, but, before doing so, leave exposed one part of the flexor profundus digitorum, as another part of that muscle comes to the surface between the flexor ulnaris and flexor radialis. It is inserted into the palmar ossicle, and therefore superficially to the tendon of the extensor carpi ulnaris.

Fig. 14.



Deeper flexor surface of right forearm.

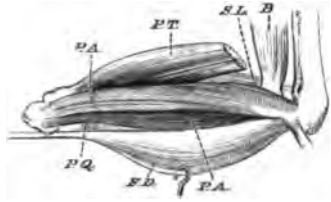
F. D. Flexor profundus digitorum. *F. P.* Flexor longus pollicis. *F. R.* Flexor radialis. *P. A.* Pronator accessorius. *P. T.* Pronator quadratus.

Flexor longus pollicis (figs. 8, 10, & 28, *F. P*). This large muscle has three distinct origins. The first is from the internal condyle, between the two tendons of origin of the flexor carpi radialis. The second is from the internal condyle, below the first head of origin. These two parts soon unite to form one belly. The third head of origin springs from the olecranon and the radial aspect of the upper part of the ulna. It unites with the other belly about the middle of the forearm (where the ulnar nerve comes out over it), and passing distad ends in a strong tendon which divides into four, one division going to each of the three radial digits (pollex, index, and mid digit), and the fourth division uniting with that tendon of the flexor profundus digitorum which goes to the fourth digit.

* Meckel, *l. c.* p. 369.

The *flexor profundus digitorum* (figs. 10, 14, 15, 16, & 28, *F. D*) takes origin by only two heads. The first of these arises from the internal condyle in union with the similarly arising head of the flexor longus pollicis, and similarly embraced by the tendons of origin of the flexor carpi radialis. The second head springs from the radial side of the olecranon, and from the radial aspect of the ulna for about its upper three-fourths, its summit being contiguous (fig. 16) to the ulnar side of the insertion of the brachialis anticus. The two parts of the muscle having united about the middle of the forearm, it extends distad, and ends in a strong tendon which passes in a deep groove at the distal end of the ulna, and side by side with the tendon of the flexor longus pollicis. The tendon then bifurcates. The radial bifurcation very soon receives a short slip from the ulnar bifurcation, then a long slip from the flexor longus pollicis (its fourth and most ulnad tendon), and finally a long and very delicate slip, one more from the ulnar bifurcation. It then goes to the fourth digit. The ulnar bifurcation gives first a very short, and then a long and very delicate slip to the radial bifurcation, and then goes to the fifth digit.

Fig. 15.



Deepest flexor surface of right forearm.

B. Biceps. *F. D.* Flexor profundus digitorum. *P. A.* Pronator accessorius. *P. Q.* Pronator quadratus. *P. T.* Pronator teres. *S. L.* Supinator longus.

Lumbricales (fig. 28). There are three lumbrical muscles in the hand.

The first of these arises from the ulnar side of the long flexor tendon of the fourth digit, and goes to the same side of the same digit.

The second arises from the radial side of the long flexor of the fourth digit, and goes to the same side of the same (fourth) digit.

The third arises from the ulnar side of the long flexor tendon of the third digit, and goes to the same (ulnar) side of the same (third) digit.

Flexor brevis digitorum. This muscle is confined entirely to the hand. It springs from the annular ligament which passes from the first to the fifth metacarpal, and is inserted into the digits, the long flexor tendons passing between its fibres

Flexor brevis pollicis (fig. 8, *B. P*). A thick, short muscle which may perhaps be thus named arises from the palmar ossicle and annular ligament, and is inserted into the radial margin of the

pollex distad and radiad of the insertion of the extensor ossis metacarpi pollicis.

Flexor brevis minimi digiti. Another small muscle arises from the ulnar side of the palmar ossicle, and is inserted into the ulnar side of the fifth digit.

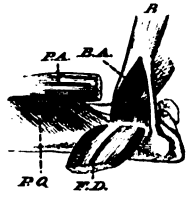
Adductor digiti tertii (fig. 9, A^3). This springs from the ligament connecting the third and forth metacarpals, and is inserted into the ulnar side of the third digit.

Adductor digiti quarti (fig. 9, A^4). Another small muscle arises from the same ligament, connecting the third and fourth metacarpals, and is inserted into the radial side of the fourth digit.

The *extensores metacarporum* are very numerous, but are all short muscles, except the one which goes to the pollex.

Extensores I. and II. or *extensor ossis metacarpi pollicis** (figs. 8, 9, 10, 11 & 12, *M. P*). This is a very large and even a double muscle, like the homotypal muscle of the pes. The longer part arises (in intimate connexion with the deeper part of the supinator longus) from the lower end of the humerus, close to its articulation with the radius. Passing downward, it joins the shorter part a little above the wrist. This shorter part springs from the radiad aspect of the ulna for its whole length. Passing downward and radiad, it unites with the longer part, and the united muscle is inserted into the radial aspect of the dorsum of the distal end of the first metacarpal bone.

Fig. 16.



Part of deepest flexor surface of right forearm.

B. Biceps. *B.A.* Brachialis anticus. *F.D.* Flexor profundus digitorum. *P.A.* Pronator accessorius. *P.Q.* Pronator quadratus.

Extensor m. III. (fig. 9, E^3). This little muscle arises from the extensor aspect of the styloid process of the radius, and is inserted into the distal part of the dorsum of the first metacarpal.

Extensor m. IV. (figs. 9 & 11, E^4). This takes origin just beneath and beside the last-described muscle, and is similarly inserted into the second metacarpal.

The *extensor m. V.* (figs. 9 & 11, E^5) arises just beneath and beside the last described, and is similarly inserted into the third metacarpal. A few of its fibres take origin from the ulnar carpal ossicle.

The *extensor m. VI.* (figs. 9 & 11, E^6) springs from the central carpal ossicle, and from the dorsum of the first three metacarpals.

* Meckel, *l. c.* p. 382.

It is inserted into the base of the fourth metacarpal. This muscle is overlapped by the extensores m. III., IV. & V., and appears superficially (its fibres running in a contrary direction to those of the extensores last named) between the insertions of the extensor carpi radialis longior and the extensor carpi radialis brevior.

Extensor m. VII. (fig. 11, E^7). This is exceedingly small, and arises from the dorsal surface of the central carpal bone and passes to the fifth digit.

Extensor m. VIII. (fig. 11, E^8). This muscle springs from the extensor surface of the ulnar carpal bone and passes to the dorsum of the fifth metacarpal.

Extensor m. IX. (figs. 1 & 11, E^9). A rather larger muscle takes origin from the ulnar side of the projecting styloid process of the ulna, and is inserted into the dorsum of the fifth metacarpal, side by side with the extensor m. VIII.

Beside these extensors of the metacarpal bones, there are five extensors of the phalanges, *extensores phalangorum* (fig. 9, B^1, B^2 & B^3). Each of these passes from the dorsum of one of the metacarpals to the ungual phalanx of the same digit.

Interossei. Beside the small muscles which have been described as flexores breves and adductors, there are other small muscles, which may be termed interrosseous, and which pass from the palmar surface of the metacarpal bones to the sides of the digits.

II. Muscles of the Pelvic Limb.

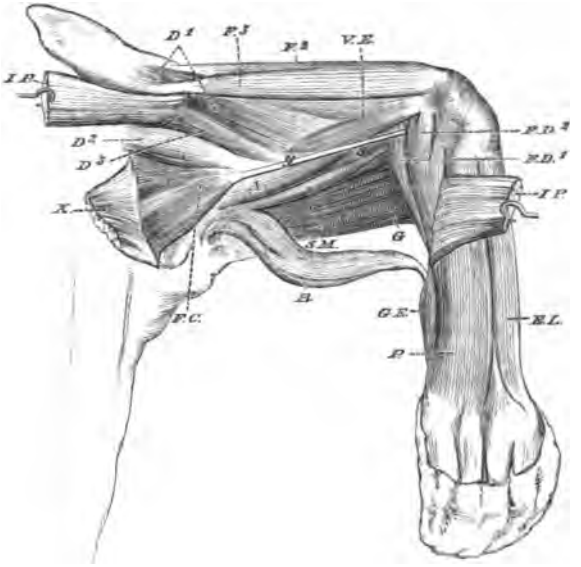
Gracilis (figs. 4, 18, 19, 23, & 24, *G*). By this name it is convenient to still designate the muscle which I have already so named in the Iguana, *Menopoma*, and *Menobronchus*. Nevertheless Professor Rolleston is very possibly right in deeming it not to be the homologue of the human gracilis; yet I cannot but remark its great resemblance to the muscle I have called gracilis of the Echidna, though freely admitting that I may have been wrong in so calling the muscle in question in that Monotreme. Whatever should be its true designation, it is very large and stout in Parson's Chameleon. It arises from the whole pubo-ischiatic symphysis, and is inserted into the tibial side of the the tibia, just below and within the internal lateral ligament.

The *tibial adductor* (figs. 4, 18, 19, 21, 23, & 24, *S*) arises by a rather strong tendon from the brim of the pelvis, just internal to the iliacus and a little distance from the anterior end of the pubic symphysis. Continuing distad, it bifurcates just above the semitendinosus. The smaller part goes (in common with, but above, the semitendinosus) into the tibial aspect of the interarticular cartilage. The larger part goes (in common with the tendon of the semimembranosus) into the antero-peroneal aspect of the head of the tibia, passing, from behind forwards, between the tibia and fibula.

Semimembranosus (figs. 17, 23, & 24, *S. M*). A muscle (which seems to answer to the second part of the muscle I have called semimembranosus in the Iguana) arises from the postero-inferior aspect

of the tuberosity of the ischium, close to the origin of the semitendinosus, which is superficial and posterior to it. It is inserted by a long and strong tendon (in common with the peroneal part of the bifurcating tibial adductor) into the antero-peroneal aspect of the head of the tibia.

Fig. 17.



Deeper muscles of outer aspect of right pelvic limb; the ilio-peroneal cut and reflected.

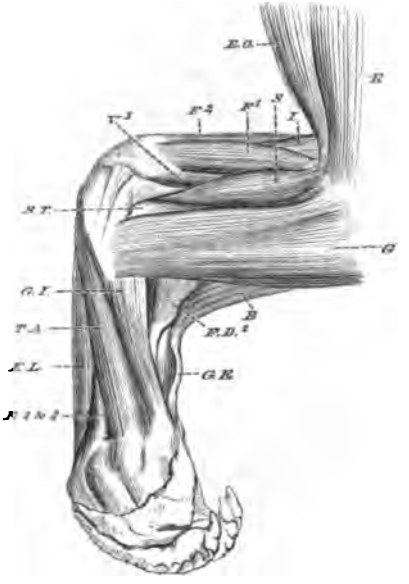
A. Adductor. *B.* Biceps. *D*¹. Gluteus primus. *D*². Gluteus secundus. *D*³. Gluteus tertius. *E. L.* Extensor longus digitorum. *F*² & *F*³. Rectus femoris. *F. C.* Femoro-caudal. *F. D*¹. Flexor longus digitorum. *F. D*². Flexor tertius digitorum. *G.* Gracilis. *G. E.* Gastrocnemius externus. *I. P.* Ilio-peroneal. *P.* Peroneus. *S.* Tibial adductor. *S. M.* Semimembranosus. *V. E.* Vastus externus. *X.* Gluteus maximus. *y.* Tendon of femoro-caudal.

Semitendinosus (figs. 18, 19, 23, & 24, *S. T.*). This springs, in common with the biceps, close to the tuberosity of the ischium, from the tendinous ilio-ischiatic arch, just behind the origin of the semimembranosus. Crossing beneath the tibial adductor, it is inserted into the tibial aspect of the interarticular cartilage, in common with (though below) the smaller (tibial) branch of the bifurcating tibial adductor. This may, perhaps, be the muscle which Professor Rolleston considers to be the gracilis.

Biceps (figs. 2, 17, 18, 23, & 24, *B.*). This muscle takes origin from the before-mentioned ilio-ischiatic tendinous arch, close opposite to and more or less continuous with the gluteus maximus. Passing downward to the calf of the leg, it is inserted, by a tendon,

between the distal ends of the gastrocnemii, into the peroneal aspect of the plantar ossicle. It has the gastrocnemius internus superficial to it, and is itself superficial to the gastrocnemius externus.

Fig. 18.



Inner side of right pelvic limb.

B. Biceps. *E. L.* Extensor longus digitorum. E^1 & E^2. Extensores metatarsorum. *E. O.* External oblique. F^1 & F^2. Rectus femoris. $F. D^1$. Gluteus primus. *G.* Gracilis. *G. E.* Gastrocnemius externus. *I.* Iliacus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. *V. I.* Vastus internus.

The *ilio-peroneal* (figs. 2, 17, 19, 20, 23, & 24, *I. P*) arises from the outside of the ilium, just behind and more or less beneath the origin of the third part of the rectus femoris. Passing distad, and greatly expanding, it is inserted outside the leg into the posterior margin of the fibula between the peroneus and the tibialis posticus. It covers in the great sciatic nerve.

The *iliacus* (figs. 4, 18, 19, 21, & 22, *I*, I^1, I^2, I^3) is more or less divisible into three parts.

The first part takes origin from the inside of the ilium, below the tendon of origin of the internal oblique.

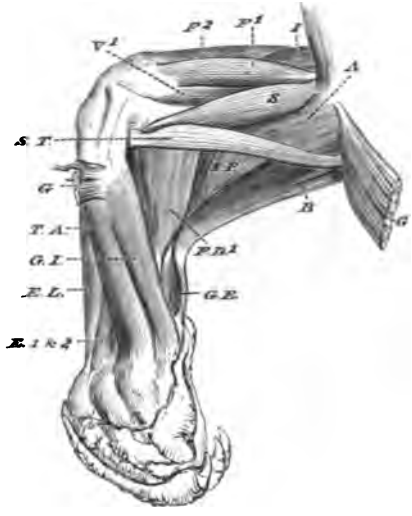
The second part extends far back, springing from the inside of the ischium.

The third and smallest part arises from just inside the pubis, but only extends a very little on the visceral surface of the pelvis.

These three parts join together, and are inserted together into the

upper part of the shaft of the femur, passing beneath what I have distinguished as the first part of the gluteus medius, and just below and slightly tibiad to the insertion of what I have called gluteus minimus.

Fig. 19.



Deeper muscles of inner aspect of right pelvic limb.

A. Adductor. *B.* Biceps. E^1 & E^2. Extensores metatarsorum. *E. L.* Extensor longus digitorum. F^1 & F^2. Rectus femoris. *F. D*[1]. Flexor longus digitorum. *G.* Gracilis. *G. E.* Gastrocnemius externus. *G. I.* Gastrocnemius internus. *I.* Iliacus. *I. P.* Ilio-peroneal. *S.* Tibial adductor. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. V^1. Vastus internus.

Gluteus maximus (figs. 2, 17, & 27, *X*). This name has been applied by me in the Iguana*, *Menopoma*†, and *Menobranchus*‡, to a muscle which, on further consideration, seems to me can have little claim to it. On the other hand, I think that the muscle which I called pyriformis in the Iguana§, answers to the one I am now about to describe in the Chameleon, and which has a considerable resemblance to that which I designated as gluteus maximus in the Echidna‖. It arises, in Parson's Chameleon, from the transverse processes of the more anterior caudal vertebræ, and is inserted into the tendinous arch which passes from the posterior margin of the ilium to the tuberosity of the ischium. It is blended posteriorly with the transversus perinei, and, but for the tendinous arch, would be continuous with the biceps, thus strongly resembling the gluteus maximus of the Echidna.

* P. Z. S. 1867, p. 791.
† P. Z. S. 1869, p. 270.
‡ P. Z. S. 1869, p. 464.
§ P. Z. S. 1867, p. 793, fig. 15, *P. f.*
‖ Trans. Linn. Soc. vol. xxv. 1866, p. 391, pl. 53. figs. 2, 9. *mx.*

Femoro-caudal (figs. 17, 24, & 27, *F. C* & *y*). This is large and fleshy, and arises beneath the transverse processes of the four caudal vertebræ behind the sacral vertebræ. The anterior and smaller part of this muscle is somewhat separate, and folded over the hinder and larger part. The muscle is in part inserted into the

Fig. 20.



Deep muscles of back of right leg.

E. B[4]. Extensor phalangorum. *F. D*[2]. Flexor tertius digitorum. *F. H.* Flexor hallucis. *G.* Gracilis. *G. I.* Gastrocnemius internus. *I. P.* Ilio-peroneal. *P.* Peroneus. *P P.* Popliteus. *P. T.* Peroneo-tibial. *T. P.* Tibialis posticus.

posterior aspect of the great trochanter; in part it ends in a very delicate tendon (*y*), which runs along the outer edge of the semimembranosus, the great sciatic nerve crossing it superficially on its outer side. The tendon dips down beneath the head of the flexor tertius digitorum on one side, and the tendon of the gastrocnemius externus and the head of the flexor longus digitorum on the other. It is inserted into the posterior aspect of the interarticular cartilage, which is placed between the femur and the tibia.

Three muscles, which I cannot at present accurately determine, but which I provisionally designate as gluteus primus, gluteus secundus, and gluteus tertius, pass from the ilium to the outside of the femur.

Gluteus primus (figs. 4, 17, & 21, D^1). This seems to answer to the muscle I have called gluteus medius in the Iguana*. It arises between two heads of the rectus femoris, from the lower part of the outer side of the ilium. Passing downwards, just in front of the gluteus tertius, and beneath the third part of the rectus femoris, it is inserted into the middle of the outer side of the shaft of the femur, between the forked origin of the vastus externus.

The *gluteus secundus* (figs. 17, 22, & 27, D^2) springs from the postero-external surface of the ilium, having the femoro-caudal con-

* P. Z. S. 1867, p. 791.

tiguous to it behind, and the ilio-peroneal in front. It is inserted into the postero-external side of the great trochanter, immediately in front of the insertion of part of the femoro-caudal, and conterminous with the hinder border of the gluteus primus.

Gluteus tertius (fig. 17, D^3). A small and delicate muscle, which I thus distinguish, arises from a small portion of the lowest part of the posterior margin of the ilium, beneath the origin of the gluteus secundus. It is inserted into the outer side of the great trochanter, just below the insertion of the last-named muscle, and conterminous with the upper end of the insertion of the gluteus primus.

Pectineus? A very small and delicate muscle lies hidden between the gluteus tertius and the insertion of the iliacus. It arises, just behind the brim of the pelvis, from the lowest part of the outer side of the ilium, below the origin of the gluteus primus. It is inserted into the outer side of the upper part of the femur, beneath the gluteus tertius, of which, indeed, it may be but an accessory portion.

Fig. 21.



Front view of right thigh.

C. Crureus. D^1. Gluteus primus. F^1, F^2, & F^3. Rectus femoris. *I.* Iliacus. *O.* Obturator externus.

Adductor (figs. 19, 23, & 24, *A*). This thick muscle arises from the pelvis, at and near the ischiatic symphysis. Passing down, it is inserted into rather the outside of the shaft of the femur, below the insertion of the femoro-caudal and below and outside the insertions of the obturators. It is obscurely divided into a longer and more slender posterior part, and a thicker, shorter, more anterior portion.

The *quadratus femoris* (fig. 22, *Q*) arises from the postero-superior side of the tuberosity of the ischium, and is inserted into the summit of the head of the femur, above the great trochanter, but more in front (*i. e.* on the extensor aspect) of the femur.

Obturator externus (fig. 21, *O*). This muscle arises from the outer surface of the ischium, and is conterminous with the quadratus femoris. It is inserted all along the great trochanter, on the inner side of the femoro-caudal.

Fig. 22.



Inner side of right half of pelvis.

*I*². Gluteus secundus. *I*¹, *I*², *I*³. Iliacus. *O. I.* Obturator internus. *Q.* Quadratus femoris.

Obturator internus (fig. 22, *O. I*). This muscle arises inside the pubis, conterminous with the inner margin of the origin of the third part of the iliacus. Passing downward (through the obturator foramen, and thus becoming superficial to the second part of the iliacus), it is inserted into the femur along its posterior side down to the summit of the insertion of the adductor.

Rectus femoris (figs. 2, 4, 17, 18, 19, & 21, *F*¹, *F*², & *F*³). Three distinct muscular parts seem to belong to the category to which the rectus femoris of Mammals belongs. One of these parts seems to represent that which I have called rectus femoris in the Iguana*, and the other two parts to answer to what I have called gluteus maximus in the Iguana†.

The first part (*F*¹) arises by a very strong tendon from the margin of the acetabulum.

The second part (*F*²) springs from the anterior margin of the ilium, in common with the tendon of the internal oblique.

The third part (*F*³) takes origin from the posterior margin of the ilium, between the origins of the gluteus primus and the ilio-peroneal.

Passing downward these three parts unite with the deeper extensor muscles of the thigh.

Vastus externus (figs. 2 & 17, *V. E*). This muscle arises from the lower half of the outer side of the femur. Distally it fuses with the other extensors.

* P. Z. S. 1867, p. 791. † Ibid.



J. Biceps. J. F. Femoro-tibialis. J. M. Femoro-tibialis externus. J. I. Femoro-tibialis internus. J. P. Femoro-tibialis posticus. G. Gastrocnemius externus. G. I. Gastrocnemius internus. P. Peroneus. T. Tibialis anticus. S. M. Semimembranosus. S. T. Semitendinosus. T. A. Tibialis anticus. T. P. Tibialis posticus. p. Tendon of Achilles.

Gastrocnemius externus (figs. 17, 18, 19, 23, & 24, *G. E*). This is very large, but with difficulty separable from the two preceding muscles. It arises from the extensor surface of the femur, its origin extending upward to the neck of the bone on its inner aspect, passing up on the inner side of the insertion of the iliacus; fusing with the other extensors, it is inserted with them into the patella.

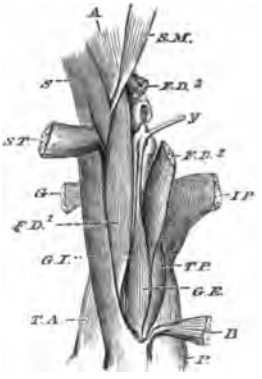
The *gastrocnemius externus* (figs. 17, 18, 19, 23, & 24, *G. E*) arises by a long and strong, but delicate tendon from the postero-peroneal aspect of the interarticular cartilage. This tendon passes down between the flexor longus and flexor tertius digitorum. Rapidly broadening downward (as a fleshy mass having the gastrocnemius internus superficial to it), it is inserted into the plantar ossicle.

The *gastrocnemius internus* (figs. 18. 19. 20, 23, & 24, *G. I*) does

not take origin either from the femur, as in the Iguana*, or from the interarticular cartilage, but from the posterior aspect of the tibia, partly within the internal lateral ligament. Passing downward obliquely to the peroneal side of the foot, it is inserted (close to and superficial to the insertion of the biceps) into the peroneal side of the plantar ossicle.

At its origin this muscle has the insertion of the gracilis on its inner side, that of the semitendinosus on its peroneal side.

Fig. 24.



Deeper muscles of back of right leg.

B. Biceps. *F. D*¹. Flexor longus digitorum. *F. D*². Flexor tertius digitorum. *G.* Gracilis. *G. E.* Gastrocnemius externus. *G. I.* Gastrocnemius internus. *I. P.* Ilio-peroneal. *P.* Peroneus. *S.* Tibial adductor. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. *T. P.* Tibialis posticus. *y.* Tendon of femoro-caudal.

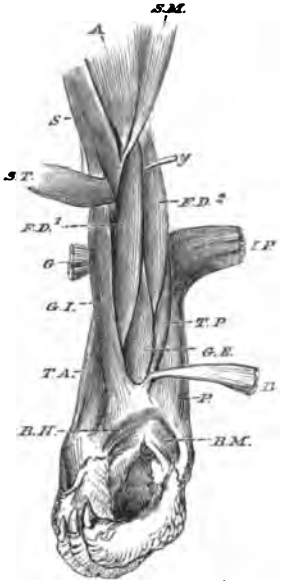
Flexor longus digitorum (figs. 17, 18, 19, 23, 24, & 29, *F. D*¹). Just reversing the condition of the gastrocnemius externus, this muscle is very broad above, but becomes tendinous below. It arises, by muscular fibres, from the femur, above the peroneal condyle (just above the femoral origin of the flexor tertius), also from the fascia behind the peroneal part of the interarticular cartilage, and, thirdly, from the hinder side of the fibula, below its summit. Passing downward it suddenly contracts to a delicate tendon placed between the tendons of the flexor hallucis and flexor tertius. It is inserted into the third and fourth, its tendon bifurcating. The branch to the fourth digit receives a slip from that tendon of the flexor tertius which goes to the fifth digit. The branch to the fourth digit receives two slips, one from the flexor tertius, the other from the flexor longus hallucis.

Flexor longus hallucis (figs. 20, 26, & 29, *F. H*). This muscle is placed very deeply (between the tibialis posticus and the popliteus),

* P. Z. S. 1867, p. 795.

The *vastus internus* (fig. 19, *V. I*) is a rather small muscle arising from the inside of the shaft of the femur, almost down to the distal end of the bone. It blends below with the other extensors.

Fig. 23.



Back view of right leg.

B. Biceps. *B. H.* Flexor brevis hallucis. *B. M.* Flexor brevis minimi digiti. *F. D*¹. Flexor longus digitorum. *F. D*². Flexor tertius digitorum. *G.* Gracilis. *G. E.* Gastrocnemius externus. *G. I.* Gastrocnemius internus. *I. P.* Ilio-peroneal. *P.* Peroneus. *S.* Tibial adductor. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. *T. P.* Tibialis posticus. *y.* Tendon of femoro-caudal.

Crureus (fig. 21, *C*). This is very large, but with difficulty separable from the two preceding muscles. It arises from the extensor surface of the femur, its origin extending upward to the neck of the bone on its inner aspect (passing up on the inner side of the insertion of the iliacus); fusing with the other extensors, it is inserted with them into the patella.

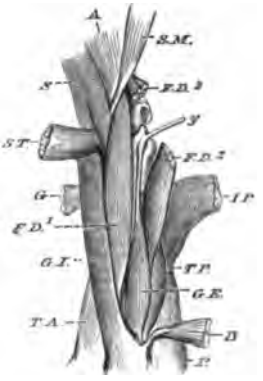
The *gastrocnemius externus* (figs. 17, 18, 19, 23, & 24, *G. E*) arises by a long and strong, but delicate tendon from the postero-peroneal aspect of the interarticular cartilage. This tendon passes down between the flexor longus and flexor tertius digitorum. Rapidly broadening downward (as a fleshy mass having the gastrocnemius internus superficial to it), it is inserted into the plantar ossicle.

The *gastrocnemius internus* (figs. 18, 19, 20, 23, & 24, *G. I*) does

not take origin either from the femur, as in the Iguana*, or from the interarticular cartilage, but from the posterior aspect of the tibia, partly within the internal lateral ligament. Passing downward obliquely to the peroneal side of the foot, it is inserted (close to and superficial to the insertion of the biceps) into the peroneal side of the plantar ossicle.

At its origin this muscle has the insertion of the gracilis on its inner side, that of the semitendinosus on its peroneal side.

Fig. 24.



Deeper muscles of back of right leg.

B. Biceps. *F. D*¹. Flexor longus digitorum. *F. D*². Flexor tertius digitorum. *G.* Gracilis. *G. E.* Gastrocnemius externus. *G. I.* Gastrocnemius internus. *I. P.* Ilio-peroneal. *P.* Peroneus. *S.* Tibial adductor. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibialis anticus. *T. P.* Tibialis posticus. *y.* Tendon of femoro-caudal.

Flexor longus digitorum (figs. 17, 18, 19, 23, 24, & 29, *F. D*¹). Just reversing the condition of the gastrocnemius externus, this muscle is very broad above, but becomes tendinous below. It arises, by muscular fibres, from the femur, above the peroneal condyle (just above the femoral origin of the flexor tertius), also from the fascia behind the peroneal part of the interarticular cartilage, and, thirdly, from the hinder side of the fibula, below its summit. Passing downward it suddenly contracts to a delicate tendon placed between the tendons of the flexor hallucis and flexor tertius. It is inserted into the third and fourth, its tendon bifurcating. The branch to the fourth digit receives a slip from that tendon of the flexor tertius which goes to the fifth digit. The branch to the fourth digit receives two slips, one from the flexor tertius, the other from the flexor longus hallucis.

Flexor longus hallucis (figs. 20, 26, & 29, *F. H*). This muscle is placed very deeply (between the tibialis posticus and the popliteus),

* P. Z. S. 1867, p. 795.

arising from the *front* of the fibula. On the extensor surface of the leg this part is covered by the peroneus, and itself covers the popliteus. The muscle also takes origin from the tibial aspect of the fibula, from its summit down to the origin of the tibialis posticus. Passing downward it ended in the right foot of the specimen in a delicate tendon, which bifurcated for the first and second digits, and also gave off a very delicate tendon joining the long flexor tendon of the third digit. On the left side there were two tendons, one bifurcating for the first and second digits, the other dividing into three for the three tibial digits.

Flexor tertius digitorum (figs. 17, 20, 23, 24, & 29, *F. D*^{2}). This muscle has three origins. The first is from the femur, above the peroneal condyle, just below the origin of the flexor longus digitorum. The second is from behind the summit of the fibula. The third is from behind the fibula lower down, just tibiad of the insertion of the ilio-peroneal. Suddenly contracting (like the flexor longus digitorum), it ends in a delicate tendon, which gives off two very delicate slips, one joining that tendon of the flexor longus digitorum which goes to the third digit, the other joining that tendon of the flexor longus which goes to the fourth digit. The tendon then continues on as the long flexor tendon of the fifth digit.

Fig. 25.



Front view of right leg.

E^1 & E^2, E^6 & E^7, E^4, E^9. Extensores metatarsorum. *F. H.* Flexor hallucis. *P.* Peroneus. *T. A.* Tibialis anticus.

These deep and long flexor tendons pass in a groove at the back of the tarsus, which groove is covered by the fascia in which the

gastrocnemii are inserted, and which gives origin to the flexor brevis hallucis. The tendons, however, are superficial to the insertion of the tibialis posticus.

Lumbricales (fig. 29). There appear to be four of these.

The first from the tibial side of the fifth flexor tendon to the peroneal side of the fourth digit.

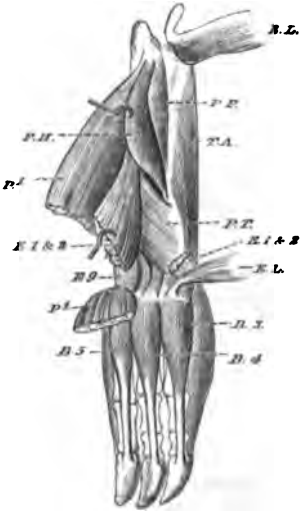
The second from the tibial side of the fourth flexor tendon to the tibial side of the fourth digit.

The third from the peroneal side of the third flexor tendon to the peroneal side of the third digit.

The fourth from the tibial side of the third flexor tendon to the tibial side of the third digit.

Tibialis posticus (figs. 20, 23, & 24, *T. P*). This arises, by muscular fibres, from the postero-tibial aspect of the fibula below the origin of the flexor longus tertius, tibiad of the insertion of the ilio-peroneal, and within (*i. e.* peronead) and partly above the origin of the peroneo-tibial. Passing downward, its strong wide tendon lines the groove, behind the tarsus, in which the flexor tendons run. It is finally inserted into the postero-inferior margin of that cup for the front of the central tarsal bone which is formed by the proximal ends of the fourth and fifth metatarsals. The tendon of insertion passes superficially to the very strong ligament which binds together the second and fifth metatarsals.

Fig. 26.



Deeper front view of right leg.

B^3–B^6. Extensores phalangorum. E^1 & E^2, E^3. Extensores metatarsorum. *E. L.* Extensor longus digitorum. *F. H.* Flexor hallucis. P^1. Peroneus. *P P.* Popliteus. *P. T.* Peroneo-tibial. *T. A.* Tibialis anticus.

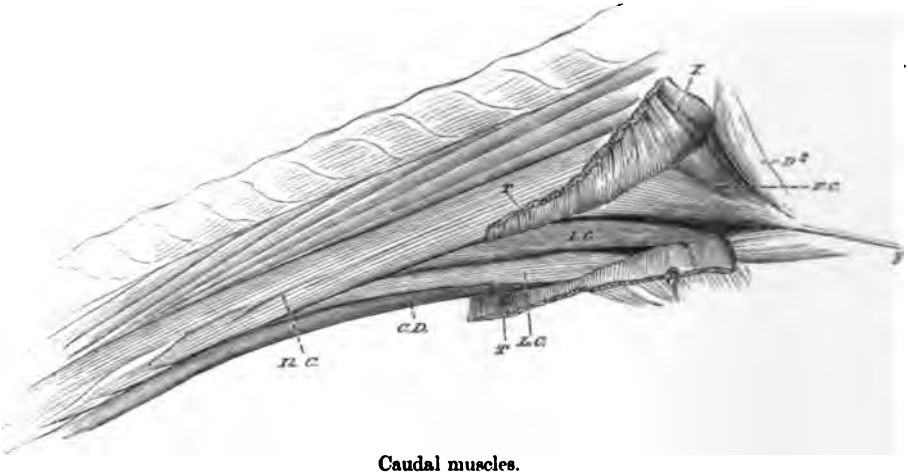
The *popliteus* (figs. 20 & 26, *P P*) arises from the tibial side of the head of the fibula so far forwards that it is visible on the front of the leg when the covering summit of the flexor longus hallucis is removed. Passing downward it is inserted into the peroneal and posterior surface of the tibia for rather more than its upper two-thirds.

Peroneo-tibial (figs. 20 & 26, *P. T*). This muscle springs from the lower half of the peroneal surface of the fibula, and is inserted (its upper fibres descending and its lower fibres passing transversely) into the lower third of the peroneal border of the tibia, and into the peroneal side of its anterior surface. It appears on the front of the leg when the first part of the extensor brevis of the hallux is removed. Behind, it is covered by the tibialis posticus.

Peroneus (figs. 2, 17, 20, 23, & 24, *P*). This is a very large muscle, which is only imperfectly to be divided into two parts.

The first part arises from the front of the fibula, the origin extending from in front of the bottom of the insertion of the ilio-peroneal, upwards and tibiad, over the front of the fibula to a level with the top of the insertion of the ilio-peroneal. It also arises by fascia from the peroneal side of the upper part of the tibia, beneath the origin there of the extensor longus digitorum, and almost as high up as the summit of the origin of the tibialis anticus. Passing downward, it is inserted into the dorsum of the fifth metatarsal.

Fig. 27.



Caudal muscles.

C. D. Infero-caudal. *D²*. Gluteus secundus. *F. C.* Femoro-caudal. *I. C.* Ischio-caudal. *Il. C.* Ilio-caudal. *L. C.* Cloacal muscle. *T.* Transversus perinei. *X.* Gluteus maximus. *y.* Tendon of femoro-caudal.

The second part springs from the peroneal border of the fibula, beneath the insertion of the ilio-peroneal, and intimately connected

with the first part. It is inserted into the enlarged base of the fifth metatarsal on its peroneal side, and into the fascia passing from that bone to the plantar ossicle.

Tibialis anticus (figs. 18, 19, 20, 23, 24, 25, & 26, *T. A*). This muscle is placed quite on the *inner* aspect of the leg. It arises from the front of the tibia as high up as immediately beneath the origin of the extensor longus digitorum—also from the inner border of the tibia, from the bottom of the internal lateral ligament down to the summit of the inner malleolus, and a little even from the lower part of the posterior surface of the tibia, below the bottom of the insertion of the popliteus. It is inserted into the tibial side of the distal part of the dorsum of the first metatarsal.

The *extensor longus digitorum* (figs. 2, 17, 18, 19, 25, & 26, *E. L*) is a thick and fleshy mass passing down the middle of the front of the leg. It arises by a strong though narrow tendon from the front of the femur, just tibiad of the peroneal articular surface—also by muscular fibres from the front of the tibia, just peronead of the origin of the tibialis anticus. It is inserted into the distal part of the dorsum of the third metatarsal.

Fig. 28.

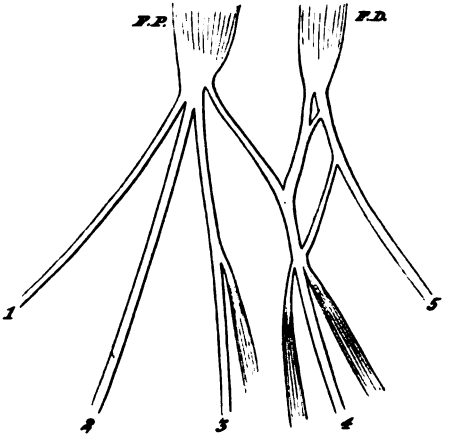


Fig. 28.—Diagram of flexor tendons of right manus.

F. D. Flexor profundus digitorum. *F. P.* Flexor longus pollicis. 1–5. Tendons to the five respective digits.

Fig. 29.

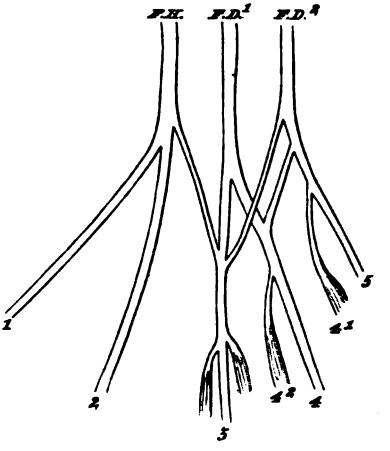


Fig. 29.—Diagram of flexor tendons of right pes.

F. D[1]. Flexor longus digitorum. *F. D*[2]. Flexor tertius digitorum. *F. H.* Flexor hallucis. 1–5. Tendons to the five respective digits.

Flexor brevis digitorum. This muscle springs from the prominent part of the first metatarsal, and, thence radiating (with the

flexor brevis hallucis superficial to it), goes to the three peroneal digits with three delicate tendons. It forms a fleshy mass, which is superficial to the long flexor tendons.

Flexor brevis hallucis (fig. 23, *B. H*). A short thick muscular mass arises from the plantar ossicle, and from the ligament which connects together the tibial and peroneal margins of the tarsus on its plantar aspect. It is inserted into the tibial aspect of the hallux, distad and tibiad to the insertion of the tibialis anticus.

Flexor brevis minimi digiti (fig. 23, *B. M*). This arises from the peroneal aspect of the plantar ossicle, and is inserted into the same side of the fifth digit down to (including) the penultimate joint of that digit.

Adductor digiti secundi. A muscle springs from the ligament which connects the second and third metatarsals, and is inserted into the peroneal side of the second digit.

Adductor digiti tertii. Another muscle similarly springs from the same ligament, and is inserted into the tibial side of the third digit.

The *extensores metatarsorum* are very numerous; but all are short muscles, except the one which goes to the hallux.

Extensores I. and II. (fig. 18, 19, 25, & 26, *E.* 1 & 2). The extensor of the second digit is double, like that of the pollex.

The larger and longer part arises from the front of the fibula (covered by the peroneus and extensor longus digitorum) for nearly its lower two-thirds. Passing downward, it is inserted by tendon into the distal part of the dorsum of the second metatarsal. The second part, much smaller, takes origin below the first part, and, joining it, is inserted together with it.

Extensor III. A very small muscle springs from the fascia in front of the central tarsal ossicle, and is inserted into the dorsum of the first metatarsal.

Extensor IV. A similarly small muscle, similarly arising, but inserted into the dorsum of the second metatarsal.

Extensor V. Another small muscle arising similarly is inserted into the dorsum of the third metatarsal, passing out between the extensor longus digitorum and the extensores I. and II.

Extensores VI. and VII. (fig. 25, *E.* 6 & 7). These two small muscles have again a similar origin, and are inserted into the distal parts of the upper surfaces of the fourth and fifth metatarsals.

Extensor VIII. (fig. 25, *E.* 8). This is a somewhat larger muscle. It arises from the lower end of the peroneal border of the fibula. Passing downward, it is inserted into the distal end of the dorsum of the fifth metatarsal.

The *extensor IX.* (figs. 25 & 26, *E.* 9) springs from the distal end of the fibula and from the peroneal tarsal bone. Passing downward, and radiating in a fan-like manner, it is inserted into the dorsum of the fifth metatarsal.

Beside these extensores of the metatarsal bones, there are five extensores of the phalanges, extensores phalangorum (fig. 26, *B.* 3, *B.* 4, & *B.* 5). Of these each passes from the dorsum of one of the metatarsals to the ungual phalanx of the same digit.

Interossei. Those in the pes are substantially similar to those of the manus.

Appendicular Nerves.

The brachial plexus seems to be formed by three spinal nerves, and gives off the subscapular nerve from its posterior part. There is one great limb-nerve, which includes both the median and the ulnar nerves in it.

The *median.* This great nerve perforates the coraco-brachialis (*i. e.* passes between the long and the short coraco-brachialis), and runs down between the postero-internal border of the brachialis anticus and the inner part of the triceps. At the bend of the elbow it perforates the pronator teres, and dipping down continues on between the last-named muscle and the flexor carpi radialis, the pronator accessorius, and the upper and larger condyloid belly of the flexor longus pollicis.

The *ulnar* nerve accompanies the median till it has perforated the pronator teres, thus passing altogether in front of the elbow-joint. Then, leaving the median, it dips down between the pronator accessorius and the large inner condyloid head of the flexor longus pollicis. It continues along on the surface of the last-named muscle, and at the wrist is superficial to its tendon, but covered by the flexor ulnaris. It passes to the palm in the region of the fifth digit.

The *posterior interosseous* nerve quits the median a little below the spot where the ulnar nerve leaves it. Passing down between the radius and the head of the *pronator accessorius*, it runs down the extensor surface of the arm upon the pronator quadratus, and covered by the extensor ossis metacarpi pollicis. It supplies the extensores metacarporum.

The lumbar plexus is formed of two spinal nerves, as also is the sacral plexus. A short lumbo-sacral nerve connects the posterior root of the lumbar plexus with the anterior root of the sacral plexus.

The *anterior crural* nerve is formed by the union of the two lumbar nerves, and descends in front of the anterior margin of the ilium at the outer border of the iliacus, which is supplied by a branch from it.

The *great sciatic* nerve, formed by the union of the two sacral nerves, passes out very near to the anterior crural, being only separated from it by the breadth of the ilium. Covered by the ilio-peroneal, it passes down between the adductor and the biceps. A large branch is given off which is covered by the femoro-caudal, and passes round the head of the femur to near the origins of the semitendinosus and semimembranosus.

The *posterior tibial* nerve, the continuation of the great sciatic, dips down between the peroneus and the flexor longus digitorum. It then crosses to the inner side of the leg beneath the gastrocnemius externus.

The *musculo-cutaneous* (?) nerve descends between the flexors and the tibialis anticus, becoming superficial at the ankle.

The *anterior tibial* nerve quits the one last noticed, and dipping between the popliteus and the flexor longus hallucis, comes out on the front of the leg above the peroneo-tibial, supplying the extensors.

Serial Homology of the Appendicular Muscles.

The question of the serial homology of the limbs has been lately considered by Professor Flower in his first course of Hunterian lectures*. He there followed out and developed certain views which I suggested in 1866†, and which had more or less commended themselves to Professor Rolleston‡. I allude especially to the notion that the gluteus medius and minimus are the serial homologues of the subscapularis, and that similarly the iliacus is the serial representative of the supra- and infraspinatus.

Against this Professor Humphry has quite recently raised some objections §, principally opposing any supposed rotation of the ilium similar to that which the whole pelvic limb undergoes during its development.

But in reply it may be said that a rotation of the ilium or scapula is by no means necessary to the view I before advocated. In speaking of such a possible rotation in connexion with the Echidna, I did so in deference to the authority of Professor Humphry, who had said‖ of the ilium and scapula, "it is probable that they also participate, to some extent, in the rotation which the limbs undergo."

All that is necessary to conceive is that bony ridges are developed in one case which are suppressed in another, not that there is any rotation. This was in my mind when I said¶, "on the whole, I am inclined to believe that extended investigations will show that the scapula and ilium may most conveniently be regarded as, so to speak, essentially columnar bones, such as we find them in Chelonians, and serving to give origin to muscles inserted into the proximal bone of each limb, but varying in shape and size, and developing ridges or processes according to the exigencies of each case." For this it is not necessary to suppose any alteration in the ventral parts of the limb-girdles.

The singular limb-structure of the Chameleon, and the more than usual resemblance between the ilium and the scapula, made me look forward with great interest to the investigation of its myology.

* See also his paper in the 'Cambridge Journal of Anatomy and Physiology' for May 1870, p. 239, and his recent 'Introduction to the Osteology of the Mammalia,' chapter xx. p. 326.

† Trans. Linn. Soc. vol. xxv. p. 395.

‡ Trans. Linn. Soc. vol. xxvi. p. 620.

§ 'Cambridge Journal of Anatomy' for November 1870, p. 67.

‖ "Observations on the Limbs of Vertebrate Animals" (1860), communicated to the Cambridge Philosophical Society.

¶ Trans. Linn. Soc. vol. xxv. p. 401.

Not that it could be expected, *à priori*, that serial muscular homologies would in it be reduced by any means to their simplest expression; for not only is the pronation of the forearm and manus extreme, but the pes is also twisted in a most exceptional manner, so that the tibialis anticus is in part on the back of the leg, and so that, when the elbow and knee are placed outward in their primitive embryonic condition, the palmar surface looks mainly outward with the pollex posterior, while the plantar surface looks mainly inwards with the hallux anterior. Nevertheless the correspondence between many of the muscles is striking; and I have endeavoured to express below the various serial relationships as they have struck me—some being of course very doubtful, but others tolerably certain.

The muscles outside the scapula seem to me to answer to those outside the scapula of Man, and the subscapularis of the Chameleon to his subscapularis. If this is so, the muscles arising outside the ilium I have named glutei; but Professor Rolleston* will possibly object to this. If they are the glutei, then the "ideal vertebral surface"† must be conceived to be suppressed in the Chameleon's ilium, and its external surface must correspond to the inner surface of its scapula. If they are not glutei, but serial homologues of suprascapular muscles, then the ideal preaxial surface must be deemed to have increased to the annihilation of the ideal postaxial one. On the latter hypotheses, the outside of the ilium will answer to the outside of the scapula, and there will be no glutei but the gluteus maximus—the subscapulares being thus without a homotype in the pelvic limb.

The following list, as suggested by the Chameleon's muscles, is offered for inquiry:—

Gluteus maximus + biceps.	Latissimus dorsi + flexor ulnaris.
Gluteus medius and minimus.	Subscapularis.
Iliacus.	Supra + infraspinatus + deltoid.
Obturator externus + adductor.	Coraco-brachialis.
Obturator internus.	Deepest part of coraco-brachialis.
Extensores femoris.	Triceps.
Semitendinosus + semimembranosus + sartorius.	Biceps + brachialis anticus (?).
Ilio-peroneal.	Scapular head of triceps.
Gastrocnemius internus.	Supinator longus.
Gastrocnemius externus.	Pronator teres (?).
Tibialis anticus.	Extensor carpi radialis longior.
Extensor longus digitorum.	Extensor carpi radialis brevior.
Peroneus.	Extensor ulnaris.
Flexor longus digitorum + flexor longus hallucis.	Flexor longus pollicis.
Flexor tertius digitorum.	Flexor longus digitorum.

* *L. c.* p. 629.

† Prof. Flower's 'Osteology,' p. 335.

Extensores metatarsorum I. & II.
Popliteus.
Tibialis posticus.
Peroneo-tibial.
Gracilis.
Pectineus.
Extensor ossis metacarpi pollicis.
Pronator accessorius.
Flexor carpi radialis.
Pronator quadratus.
Pectoralis.
Subclavius.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1870.

[N.B. Notes on all the more remarkable additions will be found in the body of the 'Proceedings' at the pages referred to after each of their names.]

Jan. 3. 1 Bonnet Monkey (*Macacus radiatus*), ♂. Presented by R. S. Kirby, Esq.

4. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Presented by Lieut. Codrington Hall, R.N.

1 Guinea Baboon (*Cynocephalus papio*), ♂. Presented by Mr. Hart.

5. 1 Stump-tailed Lizard (*Trachydosaurus rugosus*). Presented by Dr. E. L. Mosse, R.N.

6. 1 Temminck's Tragopan (*Ceriornis temminckii*). Deposited by R. Swinhoe, Esq., F.Z.S.

1 Great Northern Diver (*Colymbus glacialis*). Presented by A. R. Hunt, Esq. (*vide anteà*, p. 86).

8. 1 American Bison (*Bison americanus*), ♂. Deposited by Wm. C. Herring, F.Z.S.

1 Javan Chevrotain (*Tragulus javanicus*), ♂. Presented by H. H. Gideon, Esq.

11. 1 Long-eared Owl (*Otus vulgaris*). Presented by W. Unwin, Esq.

2 Puff-Adders (*Clotho arietans*). Presented by Capt. Thomas Waite.

12. 3 pairs of Wigeon (*Mareca penelope*). Purchased.

14. 1 Great Eagle Owl (*Bubo maximus*). Presented by C. Bamford, Esq.

15. 1 Wood-Owl (*Syrnium aluco*). Presented by R. E. L. Wade, Esq.

1 Common Kestrel (*Tinnunculus alaudarius*). Presented by R. E. L. Wade, Esq.

1 Little Armadillo (*Dasypus minutus*). Purchased. From near Mendoza (*v. a.*, p. 86).

20. 1 Tufted Duck (*Fuligula cristata*). Purchased.

22. 5 Brown Tritons (*Geotriton fuscus*). Purchased. From Italy (near Spezia) (*v. a.*, p. 86).

12 Smooth Newts (*Triton punctatus*). Purchased. From Italy (near Spezia).

24. 2 Stock Doves (*Columba œnas*). Presented by C. L. Sutherland, Esq.

Jan. 24. 1 Wood-Pigeon (*Columba palumbus*). Presented by C. L. Sutherland, Esq.
1 Griffon Vulture (*Gyps fulvus*). Deposited by J. Dow, Esq. From Mount Lebanon.
1 Grey Ichneumon (*Herpestes griseus*). Presented by Capt. Jennings.
1 Potto (*Perodicticus potto*), ♀. Purchased (*v. a.*, p. 86).
1 Snowy Egret (*Egretta candidissima*). Purchased.
1 Upland Goose (*Chloëphaga magellanica*), ♀. Received in exchange.
1 White-throated Sapajou (*Cebus hypoleucus*). Deposited by Lieut.-Col. Addison.
30. 4 Pine Grosbeaks (*Corythus enucleator*), 2 ♂ and 2 ♀. Purchased.

Feb. 1. 2 Chinese Pigs (*Sus scrofa*, var. *sinensis*), ♀. Presented by Alf. G. Stagg, Esq.
2 Summer Ducks (*Aix sponsa*). Purchased.
3. 1 Spotted Cavy (*Cœlogenys paca*). Presented by E. C. Moore, Esq.
5 Mandarin Ducks (*Aix galericulata*). Purchased.
2 Mocking Birds (*Mimus polyglottus*). Purchased.
1 Black-sided Hang-nest (*Icterus abeillæi*). Purchased.
1 Cat Bird (*Galeoscoptes carolinensis*). Purchased.
1 Solitary Thrush (*Petrocincla cyanea*). Purchased.
7 Ruddy Finches (*Carpodacus erythrinus*). Purchased.
4. 1 Macaque Monkey (*Macacus cynomolgus*). Presented by T. Douglas Murray, Esq.
1 Bonnet Monkey (*Macacus radiatus*). Deposited by Lieut.-Col. Addison.
1 Macaque Monkey (*Macacus cynomolgus*). Deposited by Lieut.-Col. Addison.
1 Macaque Monkey (*Macacus cynomolgus*). Deposited by Capt. Wingfield.
7. 1 Hog-Deer (*Cervus porcinus*), ♂. Born in the Menagerie.
1 Harnessed Antelope (*Tragelaphus scriptus*), ♀. Received in exchange.
1 Brown Hyæna (*Hyæna brunnea*). Received in exchange (*v. a.*, p. 125).
8. 1 Cape Grass-Owl (*Scelostrix capensis*). Received in exchange (*v. a.*, p. 125).
1 Cape Eagle Owl (*Bubo capensis*). Purchased (*v. a.*, p. 125).
1 Lacertine Snake (*Cœlopeltis lacertina*). Purchased.
9. 1 West-African Python (*Python sebæ*). Presented by W. C. Small, Esq.
3 White-fronted Guans (*Penelope jacucaca*). Purchased.
10. 2 Mandarin Ducks (*Aix galericulata*), ♂. Purchased.
1 Lapland Bunting (*Centrophanes lapponica*). Presented by Frederick Bond, Esq., F.Z.S.
12. 4 Barred-tailed Pheasants (*Phasianus reevesii*), 1 ♂ and 3 ♀. Deposited by Her Majesty the Queen.
15. 2 Petz's Conures (*Conurus petzi*). Received in exchange.
1 Arabian Baboon (*Cynocephalus hamadryas*), ♂. Presented by H. Duncan, Esq.
21. 2 European Souslics (*Spermophilus citillus*). Purchased.
1 Garden Dormouse (*Myoxus nitela*). Purchased.
1 Hamster (*Cricetus vulgaris*). Purchased.
23. 1 Scarlet Ibis (*Ibis rubra*). Deposited by the Viscount Hill, F.Z.S.

Feb. 24. 1 Banksian Cockatoo (*Calyptorhynchus banksii*), ♀. Purchased.
1 Maholi Galago (*Galago maholi*), ♀. Presented by Lieut. A. J. Hepper, R.E.
25. 1 Common Camel (*Camelus dromedarius*), ♂. Deposited by Mr. Sanger.
1 Hairy-nosed Wombat (*Phascolomys latifrons*), ♀. Purchased.
1 Roan Kangaroo (*Macropus erubescens*), ♂. Purchased (*v. a.*, p. 125).
26. 1 Fieldfare (*Turdus pilaris*). Purchased.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by B. L. Cumberland, Esq.
27. 1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie (*v. a.*, p. 125).
28. 2 Little Armadillos (*Dasypus minutus*), ♂ and ♀. Presented by C. D. Rowe, Esq.
1 Rufous-vented Guan (*Penelope boliviana*). Presented by Capt. J. L. Symon.

Mar. 1. 2 Vulpine Phalangers (*Phalangista vulpina*), ♀. Born in the Menagerie.
1 Lemurine Douroucouli (*Nyctipithecus lemurinus*), ♀. Presented by Mr. C. Gilman.
3 Whydah Birds (*Vidua paradisea*), ♂. Presented by Dr. F. Wickstead.
1 Red-headed Cardinal (*Paroaria larvata*). Presented by Dr. F. Wickstead.
2. 1 Crested Agouti (*Dasyprocta cristata*). Purchased.
1 Bearded Lizard (*Amphibolurus barbatus*). Purchased.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by H. S. Carline, Esq.
3. 1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by W. Wiggins, Esq.
1 Hairy-nosed Wombat (*Phascolomys latifrons*), ♂. Purchased.
4. 2 Swinhoe's Pheasants (*Euplocamus swinhoii*), ♂ and ♀. Deposited by J. J. Stone, Esq., F.Z.S.
2 Silver Pheasants (*Euplocamus nycthemerus*), ♂. Deposited by J. J. Stone, Esq., F.Z.S.
1 Pallas's Eared Pheasant (*Crossoptilon auritum*). Deposited by J. J. Stone, Esq., F.Z.S.
1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Capt. J. N. Smart.
2 Senegal Touracous (*Corythaix persa*), ♂ and ♀. Purchased.
5. 1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Arthur Lewis, Esq.
1 Marimonda Spider Monkey (*Ateles belzebuth*). Purchased.
4 Triangular Spotted Pigeons (*Columba guinea*). Purchased.
6 Manyar Weaverbirds (*Ploceus manyar*). Purchased.
8. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Deposited by Mrs. Brownlow.
1 Great Kangaroo (*Macropus giganteus*), ♀. Born in the Menagerie.
9. 1 Rabbit-eared Perameles (*Perameles lagotis*). Presented by Dr. F. von Mueller, C.M.Z.S.
1 Blossom-headed Parrakeet (*Palæornis bengalensis*). Deposited by Lieut.-Col. Seymour, F.Z.S.
1 Ring-necked Parrakeet (*Palæornis torquata*). Deposited by Lieut.-Col. Seymour, F.Z.S.
3 Angora Cats (*Felis domestica*, var. *angorensis*). Deposited by Lieut.-Col. Seymour, F.Z.S.

Mar. 11. 1 Tawny Eagle (*Aquila nævioides*). Presented by E. L. Layard, Esq., F.Z.S. From the Cape Colony.
3 Plumbeous Finches (*Spermophila plumbea*). Purchased.
12. 1 Sclater's Impeyan (*Lophophorus sclateri*), ♂. Presented by Major Montagu, Bengal Staff Corps (*v. a.*, p. 219).
1 Blyth's Tragopan (*Ceriornis blythii*), ♂. Presented by Major Montagu, Bengal Staff Corps (*v. a.*, p. 219).
13. 1 Common Seal (*Phoca vitulina*), ♂. Purchased.
14. 1 Indian Brush-tailed Porcupine (*Atherura fasciculata*). Presented by Dr. Jerdon. From Sylhet.
1 Peacock Pheasant (*Polyplectron chinquis*). Purchased.
16. 1 Ring-necked Parrakeet (*Palæornis torquata*). Presented by Mrs. Eldred.
2 Fat-tailed Sheep (*Ovis aries*), ♂ and ♀. Presented by Capt. Parker.
18. 2 Plicated Hornbills (*Buceros plicatus*), ♂ and ♀. Purchased (*v. a.*, p. 220).
1 Slender Hornbill (*Buceros gracilis*). Purchased (*v. a.*, p. 220).
1 Concave-casqued Hornbill (*Buceros bicornis*). Purchased (*v. a.*, p. 220).
1 pair of Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*). Purchased.
1 Indian Antelope (*Antilope cervicapra*), ♂. Presented by Col. H. J. Smythe.
19. 2 Concentric Terrapins (*Emys concentrica*). Presented by Henry Arthur, Esq.
1 Snow-Bunting (*Plectrophanes nivalis*). Presented by Frederick Bond, Esq., F.Z.S.
1 White-headed Sea-Eagle (young) (*Haliaëtus leucocephalus*). Presented by A. G. Yeatman, Esq.
1 Teguexin Lizard (*Teius teguexin*). Presented by George Wilks, Esq., C.M.Z.S. From Buenos Ayres.
2 Weasel-headed Armadillos (*Dasypus sexcinctus*), ♂ and ♀. Presented by George Wilks, Esq., C.M.Z.S. From Buenos Ayres.
1 Violaceous Night-Heron (*Nycticorax violaceus*). Presented by George Wilks, Esq., C.M.Z.S. From Buenos Ayres.
2 Burrowing Owls (*Pholeoptynx cunicularia*). Presented by George Wilks, Esq., C.M.Z.S. From Buenos Ayres (*v. a.*, p. 220).
21. 1 Green Monkey (*Cercopithecus callitrichus*), ♂. Deposited by Lady Wilmot.
1 Marsh Ichneumon (*Herpestes paludosus*), ♂. Purchased.
1 Caracal (*Felis caracal*). Purchased.
22. 2 Aoudads (*Ovis tragelaphus*), ♂. Born in the Menagerie.
1 Grey Wagtail (*Motacilla boarula*). Purchased.
24. 1 Blue-bonnet Parrakeet (*Psephotus hæmatogaster*). Received in exchange.
3 Golden-eyes (*Clangula glaucion*), 2 ♂ and 1 ♀. Purchased.
1 Tufted Duck (*Fuligula cristata*), ♂. Purchased.
1 Wood-loving Antelope (*Cephalophus sylvicultrix*). Received in exchange (*v. a.*, p. 220).
1 Red-headed Fruit-Pigeon (*Treron calva*). Received in exchange.
25. 2 Lions (*Felis leo*), ♂ and ♀. Deposited by Capt. Newman.
1 Indian Ratel (*Mellivora indica*), ♂. Presented by Dr. Anderson, F.Z.S.
26. 1 Ocelot (*Felis pardalis*), ♀. Presented by Vice-Admiral Sir S. Dacres, K.C.B.

Mar. 29. 1 Black Bear (*Ursus americanus*), ♂. Presented by Col. Jenyns and the Officers of the 13th Hussars.
31. 1 Puffin (*Fratercula arctica*). Received in exchange.

Apr. 1. 1 Side-striped Jackal (*Canis lateralis*). Purchased. From the Gaboon (*v. a.*, p. 279).
2 pairs of Lovebird Parrakeets (*Agapornis pullaria*). Purchased.
1 King Parrakeet (*Aprosmictus scapulatus*), ♂. Presented by John Biffen, Esq.
2 Hybrid Ibex (between *Capra megaceros* ♂ and *C. ibex* ♀). Born in the Menagerie.
1 Canada Lynx (*Felis canadensis*), ♂. Purchased.
2. 1 Smew (*Mergus albellus*), ♂. Purchased.
2 Pintails (*Dafila acuta*), ♂. Purchased.
4. 1 Indian Python (*Python molurus*). Deposited by the Hon. B. Fitzpatrick.
6. 1 Black-fronted Lemur (*Lemur nigrifrons*). Deposited by Lieut.-Col. Addison.
6 Cuming's Octodons (*Octodon cumingi*). Born in the Menagerie.
7. 1 Spotted Hyæna (*Hyæna crocuta*). Born in the Menagerie.
8. 1 Sloth Bear (*Melursus labiatus*). Presented by Capt. D. P. Murray.
1 Lanner Falcon (*Falco lanarius*). Purchased.
1 Capistrated Squirrel (*Sciurus capistratus*). Purchased.
1 Grey Squirrel (*Sciurus cinereus*). Purchased.
9. 1 Kinkajou (*Cercoleptes caudivolvulus*). Deposited by the Rev. C. Kingsley.
11. 2 Derbian Wallabies (*Halmaturus derbianus*), ♂ and ♀. Presented by H. W. Peek, Esq., M.P., F.Z.S.
1 Sociable Vulture (*Vultur auricularis*). Presented by J. Monteiro, Esq., C.M.Z.S.
1 Egyptian Sand-Lizard (*Uromastix spinipes*). Presented by F. Bond, Esq., F.Z.S.
12. 1 Red-legged Partridge (*Caccabis rufa*). Purchased.
1 Marmoset Monkey (*Hapale jacchus*), ♂. Presented by Lady Louisa Dillon.
13. 1 Philippine Deer (*Cervus marianus*), ♀. Purchased (*v. a.*, p. 279).
1 Sooty Crow Shrike (*Strepera fuliginosa*). Purchased (*v. a.*, p. 280).
2 Black-billed Gulls (*Larus melanorhynchus*). Purchased. From New Zealand.
2 Bronze-winged Pigeons (*Phaps chalcoptera*). Purchased.
5 Maugé's Doves (*Geopelia maugæi*). Purchased.
1 Great American Egret (*Egretta leuce*). Purchased. From Siam.
2 Common Cassowaries (*Casuarius galeatus*). Presented by Admiral Sir H. Keppel, K.C.B.
1 Bengalese Leopard Cat (*Felis bengalensis*). Presented by Admiral Sir H. Keppel, K.C.B.
14. 1 Himalayan Bear (*Ursus tibetanus*). Presented by Admiral Sir H. Keppel, K.C.B. From Eastern Siberia.
3 Tibetan Wolves (*Canis laniger*). Born in the Menagerie.
1 Talapoin Monkey (*Cercopithecus talapoin*), ♀. Purchased.
1 Ursine Colobus (*Colobus ursinus*). Purchased.
1 Red and Blue Maccaw (*Ara macao*). Presented by Mrs. Coffin.
1 Entellus Monkey (*Semnopithecus entellus*). Purchased.
15. 1 Cretan Goat (*Capra beden*). Born in the Menagerie.
1 Mouflon (*Ovis musimon*). Born in the Menagerie.
8 Common Hares (*Lepus europæus*). Purchased.

Apr. 16. 1 Axis Deer (*Cervus axis*). Born in the Menagerie.
2 Cretan Goats (*Capra beden*), ♂. Born in the Menagerie.
2 Many-coloured Parrakeets (*Psephotus multicolor*). Purchased.
17. 1 Mouflon (*Ovis musimon*). Born in the Menagerie.
18. 1 Bengalese Leopard Cat (*Felis bengalensis*). Purchased.
20. 2 Brazilian Caracaras (*Polyborus braziliensis*). Presented by G. Wilks, Esq., C.M.Z.S. From La Plata.
1 Chimango (*Milvago chimango*). Presented by G. Wilks, Esq., C.M.Z.S. From La Plata.
1 Chilian Sea-Eagle (*Geranoaëtus aguia*). Presented by G. Wilks, Esq., C.M.Z.S. From La Plata.
1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Dr. R. S. Peart.
1 Indian Python (*Python molurus*). Presented by Mr. E. Climpson.
21. 1 Guatemalan Amazon (*Chrysotis guatemalæ*). Purchased.
1 Angulated Tortoise (*Chersina angulata*). Purchased (*v. a.*, p. 280).
22. 1 Stanley Crane (*Tetrapteryx paradiseus*). Deposited by E. O. Blake, Esq.
2 Secretary Vultures (*Serpentarius reptilivorus*). Deposited by E. O. Blake, Esq.
23. 1 Cretan Goat (*Capra beden*), ♂. Born in the Menagerie.
1 Mouflon (*Ovis musimon*), ♀. Born in the Menagerie.
24. 1 Arabian Baboon (*Cynocephalus hamadryas*). Presented by Charles Booth, Esq.
2 Senegal Parrots (*Pœocephalus senegalensis*), ♀. Purchased.
25. 2 Derbian Wallabies (*Halmaturus derbianus*), ♂ and ♀. Presented by the Rev. J. Climenson, F.Z.S.
1 Maugé's Dasyure (*Dasyurus maugæi*). Presented by Mrs. Buckland.
26. 1 Indian Python (*Python molurus*). Received in exchange.
1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Presented by Mrs. Blatchley.
1 Masked Parrakeet (*Pyrrhulopsis personata*). Purchased.
27. 1 Ocelot (*Felis pardalis*), ♂. Presented by Capt. Bevis.
1 Vulturine Guinea-fowl (*Numida vulturina*). Presented by Dr. J. Kirk, C.M.Z.S.
28. 2 Vulpine Phalangers (*Phalangista vulpina*), ♀. Presented by Miss A. Absolon.
2 Lesser Black-backed Gulls (*Larus fuscus*). Presented by J. W. Vines, Esq.
2 Porpoises (*Phocæna communis*). Presented by Dr. L. Ormerod.
12 Short-nosed Sea-horses (*Hippocampus brevirostris*). Purchased.
29. 1 Cretan Goat (*Capra beden*). Born in the Menagerie.
1 Pig-tailed Monkey (*Macacus nemestrinus*). Presented by V. H. Straker, Esq.
30. 1 Balearic Crowned Crane (*Balearica pavonina*). Presented by Master G. B. Campbell.
1 West-African Tantalus (*Tantalus ibis*). Presented by Master G. B. Campbell.
1 Orange-headed Conure (*Conurus jendaya*). Purchased.
1 St.-Helena Seed-eater (*Crithagra butyracea*). Presented by James Dixon, Esq., F.Z.S.
1 Common Canary (*Crithagra canariensis*). Presented by James Dixon, Esq., F.Z.S.
1 Pin-tailed Whydah-bird (*Vidua principalis*). Presented by James Dixon, Esq., F.Z.S.

May 2. 1 Diamond-Snake (*Morelia spilotes*). Purchased.
1 Long-necked Chelodine (*Chelodina longicollis*). Purchased.
1 Black-necked Stork (*Xenorhynchus australis*). Purchased.
2 Variable Lizards (*Trapelus ruderatus*). Presented by E. C. Taylor, Esq., F.Z.S. From Egypt.
6 Cuming's Octodons (*Octodon cumingi*). Born in the Menagerie.
1 Bennett's Wallaby (*Halmaturus bennettii*). Born in the Menagerie.
3. 1 Sooty Monkey (*Cercocebus fuliginosus*), ♂. Purchased.
4. 1 Australian Thicknee (*Œdicnemus grallarius*). Purchased.
4 Scarlet Ibises (*Ibis rubra*). Presented by A. Blumenthal, Esq.
2 White-throated Seed-eaters (*Crithagra albogularis*). Purchased.
5. 1 Prince Alfred's Deer (*Cervus alfredi*), ♂. Deposited by the Duke of Edinburgh (*v. a.*, p. 380).
1 Fat-tailed Sheep (*Ovis aries*, var.), ♂. Deposited by the Duke of Edinburgh.
1 Great Eagle Owl (*Bubo maximus*). Deposited by the Duke of Edinburgh.
2 Sarus Cranes (*Grus antigone*). Deposited by the Duke of Edinburgh.
6. 1 Greenland Seal (*Phoca grœnlandica*), ♂. Purchased.
3 Bladder-nosed Seals (*Cystophora cristata*), 2 ♂ and 1 ♀. Purchased (*v. a.*, p. 381).
1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*), ♀. Born in the Menagerie.
5 Chestnut-breasted Finches (*Donacola castaneothorax*). Purchased.
4 Australian Quails (*Synœcus australis*), 1 ♀ and 3 ♂. Purchased.
3 Laughing Kingfishers (*Dacelo gigantea*). Purchased.
2 Emus (*Dromœus novæ hollandiæ*). Purchased.
1 Pademeleon Wallaby (*Halmaturus thetidis*), ♂. Purchased.
7. 2 Verreaux's Guinea-fowls (*Numida verreauxi*), ♂ and ♀. Purchased (*v. a.*, p. 383).
7 Pin-tailed Sand-Grouse (*Pterocles alchata*), 2 ♂ and 5 ♀. Purchased.
1 Siamese Pheasant (*Euplocamus prælatus*), ♂. Purchased.
1 Canada Crane (*Grus canadensis*). Purchased.
2 Bernier's Ibises (*Ibis bernieri*). Purchased (*v. a.*, p. 383).
1 Black-headed Conure (*Conurus nandaya*). Purchased (*v. a.*, p. 383).
1 Varying Conure (*Conurus versicolor*). Purchased.
2 Vinaceous Pigeons (*Columba vinacea*). Purchased.
1 Javan Peafowl (*Pavo muticus*), ♂. Returned from the Acclim. Soc. of Paris.
1 Red-throated Francolin (*Francolinus rubricollis*). Presented by Dr. John Kirk, C.M.Z.S.
2 Brown-headed Parrots (*Pœocephalus fuscicapillus*). Presented by Dr. John Kirk, C.M.Z.S.
3 Half-collared Doves (*Turtur semitorquatus*). Presented by Dr. John Kirk, C.M.Z.S.
2 Bronze-spotted Doves (*Chalcopelia afra*). Presented by Dr. John Kirk, C.M.Z.S.
8. 6 Upland Geese (*Chloëphaga magellanica*). Hatched in the Gardens.
9. 1 Redwing (*Turdus iliacus*). Presented by Frederick Bond, Esq., F.Z.S.
1 Black-backed Porphyrio (*Porphyrio melanotus*). Presented by A. Houlden, Esq.

May 9. 8 Dwarf Chameleons (*Chamæleon pumilus*). Deposited by the Lady Cust.

10. 2 Garganey Teal (*Querquedula circia*), ♂. Purchased.
1 Common Teal (*Querquedula crecca*), ♀. Purchased.

11. 4 Ruddy-headed Geese (*Chloëphaga rubidiceps*). Hatched in the Gardens.
2 Cape Hyraces (*Hyrax capensis*). Purchased.

12. 2 Tuberculated Lizards (*Iguana tuberculata*). Presented by F. Graham Briggs, Esq. From the Island of Nevis, W. I.
2 Graceful Ground-Doves (*Geopelia cuneata*). Purchased.
1 Adorned Terrapin (*Emys ornata*). Purchased. From Grey-town, Nicaragua.
1 White-mouthed Mud-Terrapin (*Cinosternon leucostomum*). Purchased. From Grey-town, Nicaragua.
1 Tropical Squirrel (*Sciurus æstuans*). Purchased. From Panama.

13. 1 Brown Capuchin Monkey (*Cebus apella*). Purchased.
1 Crab-eating Raccoon (*Procyon cancrivorus*). Purchased.
1 Guiana Partridge (*Odontophorus guianensis*). Purchased.
1 Keeled Boa (*Epicrates angulifer*). Presented by Mr. J. L. Symon.

14. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Mrs. Brown.

15. 2 Tigers (*Felis tigris*). Born in the Menagerie.

16. 1 Himalayan Bear (*Ursus tibetanus*), ♂. Presented by Mrs. Nourse.
1 Great Wallaroo Kangaroo (*Macropus robustus*), ♂. Purchased (*v. a.*, p. 383).
1 White-footed Wolf. Presented by C. Messiter, Esq. From the Rocky Mountains.

17. 1 Himalayan Bear (*Ursus tibetanus*). Presented by Com. Molyneux, R.N.

18. 1 Huia Bird (*Heteralocha gouldi*). Purchased (*v. a.*, p. 383).
1 Hyacinthine Maccaw (*Ara hyacinthina*). Purchased.

19. 7 Ruddy Sheldrakes (*Tadorna rutila*). Hatched in the Gardens.
4 Turquoisine Parrakeets (*Euphema pulchella*). Purchased.
1 Black-faced Spider Monkey (*Ateles ater*). Presented by John Templeton, Esq.
2 Australian Sacred Ibises (*Ibis strictipennis*). Purchased.
1 Ocelot (*Felis pardalis*). Deposited by C. F. Oxley, Esq.

20. 2 Grey-headed Parrakeets (*Agapornis cana*). Deposited by Herr Hagenbeck.
2 Green-winged Doves (*Chalcophaps indica*). Presented by Col. G. W. Walker.
1 Bladder-nosed Seal (*Cystophora cristata*). Presented by Capt. D. Herd, C.M.Z.S.
1 Tuatera Lizard (*Sphenodon punctatum*). Purchased (*v. a.*, p. 383).

21. 8 Egyptian Geese (*Chenalopex ægyptiaca*). Hatched in the Gardens.

23. 1 White-backed Piping Crow (*Gymnorhina leuconota*). Presented by J. F. Blackmore, Esq.
1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.
1 White-crested Touracou (*Corythaix albo-cristata*). Purchased.
7 Dufresne's Waxbills (*Estrelda dufresnii*). Purchased.
1 South-African Fire-finch (*Estrelda rubricata*). Purchased.
5 Long-tailed Weaverbirds (*Chera progne*). Purchased.
2 Red-shouldered Weaverbirds (*Euplectes axillaris*). Purchased.

May 23. 2 Common Crowned Pigeons (*Goura coronata*), ♂ and ♀. Purchased.
24. 2 Red-tailed Finches (*Estrelda bella*). Purchased.
25. 1 Yarrell's Curassow (*Crax carunculata*), ♀. Purchased.
1 Razor-billed Curassow (*Pauxi mitu*), ♂. Purchased.
1 Globose Curassow (*Crax globicera*), ♀. Purchased.
1 Sclater's Curassow (*Crax sclateri*), ♀. Purchased.
1 Prince Albert's Curassow (*Crax alberti*), ♀. Purchased.
2 Cinereous Sea-Eagles (*Haliaëtus albicilla*). Presented by the Hon. A. C. Littleton.
1 Spotted Ichneumon (*Herpestes auropunctatus*). Purchased.
3 Buff Laughing Kingfishers (*Dacelo cervina*). Purchased (*v. a.*, p. 383).
7 Variegated Sheldrakes (*Tadorna variegata*). Hatched in the Gardens.
2 Peacock Pheasants (*Polyplectron chinquis*). Hatched in the Gardens.
26. 2 Common Partridges (*Perdix cinerea*). Presented by Miss Puddick.
10 Summer Ducks (*Aix sponsa*). Hatched in the Gardens.
2 Red-breasted Guans (*Penelope pileata*). Purchased.
27. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Capt. Crozier.
28. 1 Black-striped Wallaby (*Halmaturus dorsalis*). Presented by G. M. Roberts, Esq.
30. 1 Eyed Lizard (*Lacerta ocellata*). Presented by Wm. Tait, Esq.
1 Turnstone (*Strepsilas interpres*). Presented by Wm. Tait, Esq.
1 Whimbrel (*Numenius phæopus*). Presented by Wm. Tait, Esq.
1 Common Otter (*Lutra vulgaris*), ♂. Presented by Capt. De Winton, F.Z.S.
1 Tiger (*Felis tigris*), ♂. Presented by C. A. Goodfellow, Esq.
31. 1 Markhoor (*Capra megaceros*). Born in the Menagerie.
1 Ashy-black Ape (*Macacus ocreatus*). Purchased (*v. a.*, p. 383).
1 Marsh-Ichneumon (*Herpestes paludosus*). Purchased.
2 Great Eagle Owls (*Bubo maximus*). Deposited by Major Howard Irby.
1 Common Wolf (*Canis lupus*), ♂. Deposited by Major Howard Irby.
1 Booted Eagle (*Aquila pennata*). Presented by Major Howard Irby. From Spain.
2 Pike (*Esox lucius*). Presented by Alfred G. Kemp, Esq., F.Z.S.

June 1. 1 Slender-billed Cockatoo (*Licmetis tenuirostris*). Presented by Mrs. Taplin.
1 Senegal Touracou (*Corythaix persa*). Purchased.
1 Marsh-Ichneumon (*Herpestes paludosus*). Purchased.
2. 2 Common Trumpeters (*Psophia crepitans*). Presented by Capt. Francis A. Ball.
1 Yellow Snake (*Chilobothrus inornatus*). Presented by Joseph Smith, Esq.
3. 2 Peacock Pheasants (*Polyplectron chinquis*). Hatched in the Gardens.
3 Java Sparrows (*Padda orizivora*). Purchased.
2 Spotted-sided Finches (*Amadina lathami*). Purchased.
1 Macaque Monkey (*Macacus cynomolgus*). Deposited by F. C. Webb, Esq.
4. 1 King Parrakeet (*Aprosmictus scapulatus*). Presented by Mrs. Hughes.
1 Common Bluebird (*Sialia wilsonii*). Hatched in the Gardens.

June 4. 1 Sun-bird (*Eurypyga helias*). Hatched in the Gardens.
6. 1 Domestic Goat (*Capra hircus*). Born in the Menagerie.
7. 1 Common Heron (*Ardea cinerea*). Presented by Capt. Salvin.
1 Martinique Water-hen (*Porphyrio martinicus*). Purchased.
1 Common Rhea (*Rhea americana*). Purchased.
1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.
10. 1 Banded Woodpecker (*Centurus tricolor*). Purchased.
6 Short-nosed Sea-horses (*Hippocampus brevirostris*). Received in exchange.
15 Alpine Newts (*Triton alpestris*). Purchased.
25 Marbled Newts (*Triton marmoratus*). Purchased.
1 Bimaculated Sucker (*Lepidogaster bimaculatus*). Purchased.
11. 1 Blesbok Antelope (*Damalis albifrons*). Deposited by E. O. Blake, Esq.
1 Solitary Thrush (*Petrocincla cyanea*). Deposited by Miss Forbes.
13. 1 Occipital Lizard (*Cyclodus occipitalis*). Presented by the Director of the Botanic Gardens, Adelaide. From South Australia.
2 Australian Sacred Ibises (*Ibis strictipennis*). Presented by the Director of the Botanic Gardens, Adelaide. From South Australia (*v. a.*, p. 663).
2 Black and White Geese (*Anseranas melanoleuca*). Presented by the Director of the Botanic Gardens, Adelaide. From South Australia.
1 Raven (*Corvus corax*). Presented by the Rev. J. H. Gosset.
14. 1 Lanner Falcon (*Falco lanarius*). Deposited by J. H. Gurney, Esq., jun., F.Z.S.
3 Hybrid Foxes (between *C. argentata* ♂ and *C. vulpes* ♀). Born in the Menagerie.
1 Nicobar Pigeon (*Calœnas nicobarica*). Hatched in the Gardens.
1 Leonine Monkey (*Macacus leoninus*), ♂. Purchased (*v. a.*, p. 663).
1 Philantomba Antelope (*Cephalophus maxwellii*). Presented by John Reeves, Esq., F.Z.S.
1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by John Reeves, Esq., F.Z.S.
15. 1 Maned Goose (*Bernicla jubata*). Purchased.
1 Chestnut-breasted Duck (*Anas punctata*). Purchased.
1 White Goshawk (*Astur novæ hollandiæ*). Purchased.
1 Short-eared Phalanger (*Phalangista canina*). Purchased.
1 Red Kangaroo (*Macropus rufus*). Purchased.
1 Lacertine Snake (*Cœlopeltis lacertina*). Purchased.
1 Viperine Snake (*Tropidonotus viperinus*). Purchased.
2 Horseshoe Snakes (*Zamenis hippocrepis*). Purchased.
1 Hooded Snake (*Coronella cucullata*). Purchased.
2 Ocellated Sand-Skinks (*Seps ocellatus*). Purchased.
3 Greenish Sand-Skinks (*Seps viridanus*). Purchased.
1 Fan-footed Gecko (*Ptyodactylus gecko*). Purchased.
3 Aldrovand's Lizards (*Plestiodon auratum*). Purchased.
1 Jelerang Squirrel (*Sciurus bicolor*). Purchased.
3 Horned Lizards (*Phrynosoma cornutum*). Presented by the Rev. L. Glynn. From Indianola, Texas.
2 Mulita Armadillos (*Dasypus hybridus*). Presented by Mrs. Mackinlay.
1 Lunulated Monkey (*Cercocebus lunulatus*). Presented by F. Van Zeller, Esq.
16. 5 North-African Jackals (*Canis anthus*). Born in the Gardens.
4 Black-breasted Peewits (*Sarciophorus pectoralis*). Purchased.

June 16. 2 Common Chameleons (*Chamæleon vulgaris*). Purchased.
1 Squirrel Monkey (*Callithrix sciureus*). Presented by C. W. Newall, Esq.
17. 1 Black-faced Kangaroo (*Macropus melanops*). Born in the Menagerie.
18. 5 Barred-tailed Pheasants (*Phasianus reevesii*). Hatched in the Gardens.
2 Purple Kaleeges (*Euplocamus horsfieldii*). Hatched in the Gardens.
3 Black-backed Kaleeges (*Euplocamus melanotus*). Hatched in the Gardens.
1 Yellow-billed Duck (*Anas xanthorhyncha*). Hatched in the Gardens.
20. 1 Grey Ichneumon (*Herpestes griseus*), ♀. Purchased.
21. 1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*). Born in the Menagerie.
1 Teguexin Lizard (*Teius teguexin*). Purchased.
22. 1 Common Bluebird (*Sialia wilsonii*). Hatched in the Gardens.
1 Red Ground-Dove (*Geotrygon montana*). Hatched in the Gardens.
5 Forster's Milvagos (*Milvago australis*). Purchased. From the Falkland Islands.
1 Forster's Milvago (*Milvago australis*). Presented by Capt. Macey. From the Falkland Islands.
1 Indian Crow (*Corvus splendens*). Purchased.
23. 2 Water-Ouzels (*Cinclus aquaticus*). Presented by George Taylor, Esq.
1 Turquoisine Parrakeet (*Euphema pulchella*). Received in exchange.
24. 1 Cape Buffalo (*Bubalus caffer*), ♂. Purchased.
1 Eland (*Oreas canna*), ♀. Deposited by E. O. Blake, Esq.
2 White-tailed Gnus (*Catoblepas gnu*), ♂. Deposited by E. O. Blake, Esq.
8 Wigeon (*Mareca penelope*). Hatched in the Gardens.
4 Hybrid Ducks. Hatched in the Gardens.
25. 2 Jerboas (*Dipus ægyptius*), ♂ and ♀. Received in exchange.
1 King Vulture (*Gyparchus papa*). Purchased.
27. 1 Manx Cat (*Felis domestica*, var.). Presented by W. H. Allchin, Esq.
4 Banded Grass-Finches (*Poëphila cincta*), ♂ and ♀. Received in exchange.
28. 1 South-American Rat-Snake (*Spilotes variabilis*). Purchased.
1 White-fronted Guan (*Penelope jacucaca*). Purchased.
1 Rufous-vented Guan (*Penelope boliviana*). Purchased.
1 Tiger (*Felis tigris*), ♂. Presented by Major Chaffey (5th Roy. I. Lancers) and Capt. Daniell and Officers of 102nd Fusiliers.
1 Wood-Owl (*Syrnium aluco*). Presented by Thos. Collbran, Esq.
29. 1 Water-Chevrotain (*Hyomoschus aquaticus*). Purchased.
2 Wigeon (*Mareca penelope*), ♂ and ♀. Presented by Wm. Lawson, Esq.
2 Herring-Gulls (*Larus argentatus*). Presented by Wm. Lawson, Esq.
2 Mandarin Ducks (*Aix galericulata*). Bred in the Gardens.
2 Undulated Grass-Parrakeets (*Melopsittacus undulatus*). Bred in the Gardens.
2 Peacock Pheasants (*Polyplectron chinquis*). Bred in the Gardens.

June 29. 1 Guinea Baboon (*Cynocephalus papio*), ♀. Presented by P. D. Hadow, Esq.
2 Angolan Vultures (*Gypohierax angolensis*). Purchased.

July 2. 2 White-eyebrowed Wood-Swallows (*Artamus superciliosus*). Hatched in the Gardens.
2 Common Paradoxures (*Paradoxurus typus*). Presented by P. C. Lovett, Esq.
20 Spotted Salamanders (*Salamandra maculosa*). Purchased.
4. 2 Stock Doves (*Columba œnas*). Purchased.
5. 1 Schlegel's Dove (*Peristera puella*). Presented by Capt. Butler.
1 Hybrid Cat, ♂. Presented by S. E. B. Pusey, Esq., F.Z.S.
6. 1 Sooty Monkey (*Cercocebus fuliginosus*), ♂. Purchased.
1 Bahama Duck (*Pœcilonetta bahamensis*). Hatched in the Gardens.
2 Trumpeter Swans (*Cygnus buccinator*). Hatched in the Gardens (*v. a.*, p. 664).
2 Coypus (*Myopotamus coypu*). Purchased.
3 Patagonian Cavies (*Dolichotis patachonica*). Purchased.
3 Chinchillas (*Chinchilla lanigera*), 1 ♂ and 2 ♀. Purchased.
2 Chilian Skunks (*Mephitis chilensis*), ♂ and ♀. Purchased (*v. a.*, p. 665).
2 Chilian Jackals (*Canis mayellanicus*), ♂ and ♀. Purchased (*v. a.*, p 665).
1 Annulated Tortoise (*Geoclemmys annulata*). Purchased (*v. a.*, p. 667).
1 Land-Tortoise (*Testudo elephantopus*). Purchased (*v. a.*, p. 667).
2 Argentine Tortoises (*Testudo chilensis*). Purchased (*v. a.*, p. 667).
3 Patagonian Conures (*Conurus cyanolyseos*). Purchased.
1 Slight-billed Parrakeet (*Henicognathus leptorhynchus*). Purchased.
1 Condor Vulture (*Sarcorhamphus gryphus*), ♂. Purchased (*v. a.*, p. 665).
3 Burmeister's Cariamas (*Chunga burmeisteri*). Purchased (*v. a.*, p. 666).
3 Black-faced Ibises (*Ibis melanopis*). Purchased.
8 Black-winged Doves (*Metriopelia melanoptera*). Purchased.
6 Spotted Doves (*Columba maculosa*). Purchased.
5 Zenaida Doves (*Zenaida auriculata*). Purchased.
3 Cayenne Lapwings (*Vanellus cayennensis*). Purchased.
6 Rosy-billed Ducks (*Metopiana peposaca*), 3 ♂ and 3 ♀. Purchased (*v. a.*, p. 666).
8 Chilian Ducks (*Dafila spinicauda*). Purchased (*v. a.*, p. 666).
6 Chiloe Wigeon (*Mareca chiloensis*), 3 ♂ and 3 ♀. Purchased (*v. a.*, p. 667).
2 Chilian Swans (*Cygnus coscoroba*). Purchased (*v. a.*, p. 666).
4 Black-necked Swans (*Cygnus nigricollis*), ♂ and ♀. Purchased (*v. a.*, p. 666).
7. 1 Coati (*Nasua nasica*), ♀. Presented by Mr. J. Taylor.
1 Barred-tailed Pheasant (*Phasianus reevesii*). Hatched in the Gardens.
3 Japanese Pheasants (*Phasianus versicolor*). Hatched in the Gardens.
1 African Leopard (*Felis varia*), ♂. Presented by F. H. Oliver, Esq.
1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*), ♂. Received in exchange.

July 8. 3 Chestnut-backed Weaverbirds (*Hyphantornis castaneofuscus*). Purchased.
9. 5 Shovellers (*Spatula clypeata*). Hatched in the Gardens.
11. 1 Indian Cobra (*Naia tripudians*). Purchased.
1 Common Otter (*Lutra vulgaris*). Presented by Viscount Hill, F.Z.S.
12. 7 Variegated Sheldrakes (*Tadorna variegata*). Hatched in the Gardens.
1 Common Quail (*Coturnix communis*). Deposited by Mrs. Todd.
1 Moorish Magpie (*Pica mauritanica*). Presented by A. E. Guest, Esq.
2 Varied Turnix (*Hemipodius varius*), ♂ and ♀. Purchased.
14. 1 Variegated Spider Monkey (*Ateles variegatus*), ♀. Presented by the Hon. A. H. Gordon, C.M.Z.S. From the Upper Caura River, Venezuela (*v. a.*, p. 668).
15. 1 Vulpine Phalanger (*Phalangista vulpina*), ♂. Presented by W. L. Crowther, Esq., C.M.Z.S.
1 Black and Yellow Cyclodus (*Cyclodus nigro-luteus*). Presented by W. L. Crowther, Esq., C.M.Z.S.
1 Persian Deer (*Cervus maral*), ♂. Born in the Menagerie.
18. 1 Subcylindrical Hornbill (*Buceros subcylindricus*). Purchased (*v. a.*, p. 668).
19. 1 Moustache-Monkey (*Cercopithecus cephus*), ♂. Presented by Major-Gen. Gambier.
1 Black and White Blind Snake (*Typhlops nigro-albus*). Purchased (*v. a.*, p. 668).
1 West-African Python (*Python sebæ*). Deposited by Mr. Sanger.
20. 1 Bateleur Eagle (*Helotarsus ecaudatus*). Purchased.
1 Common Adder (*Pelias berus*). Presented by Capt. Bryan Cooke.
1 Roan Kangaroo (*Macropus erubescens*), ♂. Purchased (*v. a.*, p. 668).
21. 1 Common Kestrel (*Tinnunculus alaudarius*), ♂. Presented by Mrs. Goodman.
22. 1 Rattlesnake (*Crotalus durissus*). Presented by T. S. Townsend, Esq.
1 Common Fox (*Canis vulpes*), ♀. Presented by Ingram Chapman, Esq.
23. 1 Blue-headed Pigeon (*Starnœnas cyanocephala*). Hatched in the Gardens.
1 Black-headed Lemur (*Lemur melanocephalus*), ♀. Purchased.
1 Common Wombat (*Phascolomys wombat*), ♂. Purchased.
2 Angola Vultures (*Gypohierax angolensis*). Purchased.
25. 1 Deep-nosed Pipefish (*Syngnathus typhle*). Presented by Mr. Penny.
3 Fifteen-spined Sticklebacks (*Gasterosteus spinachia*). Presented by Mr. Penny.
1 Parasitic Anemone (*Actinia parasitica*). Presented by Mr. Penny.
1 Common Genet (*Genetta vulgaris*), ♂. Presented by Capt. W. B. Drinan.
1 Red and Yellow Macaw (*Ara chloroptera*). Deposited by Mr. Jerber.
1 Water-Chevrotain (*Hyomoschus aquaticus*). Purchased.
3 Jerboas (*Dipus ægyptius*). Presented by Capt. Weeks.
27. 1 Japanese Deer (*Cervus sika*). Born in the Menagerie.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by G. E. Herring, Esq.

July 27. 1 Weasel (*Mustela vulgaris*). Presented by Capt. Salvin.
28. 1 Hawk's-billed Turtle (*Caretta imbricata*). Presented by Mr. T. J. Quelch.
1 Common Boa (*Boa constrictor*). Presented by Mr. J. L. Symon.
1 Ocelot (*Felis pardalis*), ♀. Purchased.
1 Prince Albert's Curassow (*Crax alberti*), ♀. Purchased.
2 Globose Curassows (*Crax globicera*), ♂ and ♀. Purchased.
2 Galeated Curassows (*Pauxi galeata*). Purchased (*v. a.*, p. 668).
2 Banded Toucans (*Pteroglossus torquatus*). Purchased. From Panama.
1 Lemurine Douroucouli (*Nyctipithecus lemurinus*). Purchased.
29. 1 Blunt-nosed Lemur (*Hapalemur simus*). Purchased (*v. a.*, p. 668).
2 White-fronted Lemurs (*Lemur albifrons*), ♂ and ♀. Purchased.
3 Giraffes (*Camelopardus giraffa*), ♂. Deposited by Mr. Rice.
1 Æthiopian Ant-Bear (*Orycteropus æthiopicus*), ♂. Purchased. From Upper Nubia (*v. a.*, p. 668).
1 Marimonda Spider Monkey (*Ateles belzebuth*), ♀. Purchased.
30. 1 Burchell's Zebra (*Equus burchellii*), ♂. Born in the Menagerie.
1 Bare-faced Fruit-Pigeon (*Treron calva*). Purchased.
1 Variegated Sheldrake (*Tadorna variegata*). Hatched in the Gardens.

Aug. 1. 1 Tiger Bittern (*Tigrisoma brasiliense*). Presented by Capt. J. A. Perry.
2 Pinche Monkeys (*Hapale œdipus*). Deposited by Mr. J. L. Symon.
1 Pinche Monkey (*Hapale œdipus*). Received in exchange.
2. 1 Common Kestrel (*Tinnunculus alaudarius*). Presented by D. M'Donnell, Esq.
1 Greater Spotted Woodpecker (*Picus major*). Purchased.
4 South-African Partridges (*Francolinus afer*). Purchased.
3 White-winged Whydah-birds (*Vidua albonotata*). Purchased.
1 Two-spotted Paradoxure (*Nandinia binotata*). Purchased.
2 Quebec Marmots (*Arctomys empetra*), ♂ and ♀. Purchased.
3. 1 Pluto Monkey (*Cercopithecus pluto*), ♂. Purchased (*v. a.*, p. 670).
1 Brown Capuchin Monkey (*Cebus apella*), ♀. Presented by J. D. Gibb, Esq.
1 Guinea Baboon (*Cynocephalus papio*). Presented by Mrs. Smethurst.
1 Caracal (*Felis caracal*). Presented by Kirby Green, Esq.
1 Andalusian Hemipode (*Hemipodus tachydromus*). Presented by Kirby Green, Esq.
4 Grey Pigeons (*Columba corensis*). Deposited by G. G. Browne, Esq.
1 Zenaida Pigeon (*Zenaida amabilis*). Deposited by G. G. Browne, Esq.
6. 1 Green Monkey (*Cercopithecus callitrichus*). Presented by C. Allan, Esq.
7. 4 Gold Carp (*Cyprinus auratus*). Presented by E. P. Williams, Esq.
2 Prussian Carp (*Cyprinus gibelis*). Presented by E. P. Williams, Esq.
10. 2 Jerboas (*Dipus ægyptius*). Presented by Rev. J. Climenson, F.Z.S.

Aug. 10. 1 Hawk-headed Parrot (*Deroptyus accipitrinus*). Presented by J. G. Sawkins, Esq.
6 Chameleons (*Chamæleon vulgaris*). Purchased.
4 Pantherine Toads (*Bufo pantherinus*). Purchased.
4 Passerine Owls (*Athene passerina*). Purchased.

11. 3 Cuming's Octodons (*Octodon cumingii*). Born in the Menagerie.
1 Bennett's Gazelle (*Gazella bennettii*). Presented by H. Holmes, Esq.

12. 2 White-mouthed Box-Terrapins (*Cinosternon leucostomum*). Purchased. From the Laguna de Terminos, Yucatan.
1 Adorned Mud-Tortoise (*Emys ornata*). Purchased. From Laguna de Terminos, Yucatan.
1 Mexican Tortoise (*Dermatemys abnormis*). Purchased. From the Laguna de Terminos, Yucatan.
1 Mexican Porcupine (*Cercolabes mexicanus*). Presented by Capt. J. C. Hobbs.

13. 2 Barred-tailed Pheasants (*Phasianus reevesii*). Deposited by J. Stone, Esq., F.Z.S.
2 Amherst's Pheasants (*Thaumalea amherstiæ*). Deposited by J. Stone, Esq., F.Z.S.
2 Elegant Pheasants (*Phasianus elegans*). Deposited by J. Stone, Esq., F.Z.S. (*v. a.*, p. 670).
10 Pallas's Sand-Grouse (*Syrrhaptes paradoxus*). Presented by Lieut.-Col. C. Napier Sturt, M.P., F.Z.S.
3 Roseate Spoonbills (*Platalea ajaja*). Purchased (*v. a.*, p. 670).
1 Crested Guan (*Penelope cristata*). Purchased.
1 Caspian Emys (*Emys caspica*). Presented by Heathcote Long, Esq.

14. 4 Egyptian Mastigures (*Uromastix spinipes*). Received in exchange.
3 Egyptian Sand-Lizards (*Psammosaurus griseus*). Received in exchange.

15. 2 Temminck's Tragopans (*Ceriornis temminckii*), ♂. Deposited by Robert Swinhoe, Esq., F.Z.S.
6 Amherst's Pheasants (*Thaumalea amherstiæ*), 4 ♂ and 2 ♀. Deposited by Robert Swinhoe, Esq., F.Z.S.
6 Barred-tailed Pheasants (*Phasianus reevesii*). Deposited by Robert Swinhoe, Esq., F.Z.S.
3 Pucras Pheasants (*Pucrasia macrolopha*), 1 ♂ and 2 ♀. Deposited by Robert Swinhoe, Esq., F.Z.S.

16. 2 Lions (*Felis leo*), ♂ and ♀. Presented by G. W. Duff Assheton Smith, Esq.
1 Viverrine Cat (*Felis viverrina*), ♀. Presented by G. W. Duff Assheton Smith, Esq.
1 Dingo (*Canis dingo*), ♂. Presented by G. W. Duff Assheton Smith, Esq.
1 Black Bear (*Ursus americanus*), ♀. Presented by G. W. Duff Assheton Smith, Esq.
1 Horseshoe Snake (*Zamenis hippocrepis*). Purchased.
2 Clifford's Snakes (*Zamenis cliffordii*). Purchased.
1 Dark-green Snake (*Zamenis atrovirens*). Purchased.
2 Shielded Eryx (*Eryx thebaicus*). Purchased.

18. 1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by W. K. Taunton, Esq., F.Z.S.
1 Kingfisher (*Alcedo ispida*). Presented by E. H. Reynard, Esq.
1 Golden Eagle (*Aquila chrysaëtos*). Deposited by Lieut. W. H. J. Logan Home, R.E.

Aug. 18. 2 Green Monkeys (*Cercopithecus callitrichus*), ♂. Presented by Graham Briggs, Esq. From the Island of Nevis, W. I.
2 Tuberculated Lizards (*Iguana tuberculata*). Presented by Graham Briggs, Esq. From the Island of Nevis, W. I.
19. 1 Hen Harrier (*Circus cyaneus*). Presented by Major Stapylton.
20. 1 African Leopard (*Felis varia*), ♀. Presented by F. E. Thompson, Esq., R.N.
21. 1 Common Adder (*Pelias berus*). Presented by A. H. Matthews, Esq.
23. 1 Graceful Ground-Dove (*Geopelia cuneata*). Hatched in the Gardens.
24. 1 Red Ground-Dove (*Geotrygon montana*). Hatched in the Gardens.
25. 1 European Bearded Vulture (*Gypaëtus barbatus*). Purchased. From Spain.
1 Ganga Cockatoo (*Callocephalon galeatum*). Purchased.
26. 1 Jay (*Garrulus glandarius*). Presented by F. H. T. Streatfield, Esq., F.Z.S.
1 Jackdaw (*Corvus monedula*). Presented by F. H. T. Streatfield, Esq., F.Z.S.
1 Barred-tailed Godwit (*Limosa lapponica*). Presented by H. M. Upcher, Esq., F.Z.S.
27. 2 Kappler's Armadillos (*Dasypus kappleri*). Purchased.
1 Eroded Kinixys (*Kinixys erosa*). Purchased.
3 Blue-shouldered Tanagers (*Tanagra cyanoptera*). Purchased.
29. 1 Common Cuckoo (*Cuculus canorus*). Presented by Dr. Salter, F.Z.S.
4 White Fruit-Pigeons (*Carpophaga bicolor*). Purchased.
3 White-cheeked Rails (*Gallinula javanica*). Deposited.
1 Jambu Pigeon (*Ptilonopus jambu*). Deposited.
30. 1 Maholi Galago (*Galago maholi*). Presented by Dr. Aldridge.
2 Common Cormorants (*Phalacrocorax carbo*). Deposited by Capt. Salvin.
1 Senegal River-Tortoise (*Cyclanosteus senegalensis*). Purchased.
1 Derbian Sternothere (*Sternothærus derbianus*). Purchased.
4 Crocodiles (*Crocodilus*, sp. ?). Purchased.

Sept. 1. 1 Red-necked Bustard (*Eupodotis ruficollis*). Purchased (*v. a*, p. 670).
6. 2 Egyptian Mastigures (*Uromastix spinipes*). Received in exchange.
7. 1 Leucoryx (*Oryx leucoryx*), ♀. Purchased.
2 Dorsal Squirrels (*Sciurus dorsalis*), ♀. Purchased (*v. a.*, p. 670).
8. 2 Gannets (*Sula bassana*). Presented by W. H. Scratten, Esq.
1 Roseate Cockatoo (*Cacatua roseicapilla*). Presented by W. Stuttle, Esq.
9. 2 Sloth Bears (*Melursus labiatus*), ♂ and ♀. Presented by Capt. J. C. Hicks.
1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by W. Heath, Esq.
11. 1 Common Adder (*Pelias berus*). Presented by E. Aldis, Esq.
13. 1 Arabian Baboon (*Cynocephalus hamadryas*), ♂. Presented by the Non-commissioned Officers and Sappers of the 11th Company Royal Engineers.
14. 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by S. T. Holland, Esq.

Sept. 15. 1 Vulpine Phalanger (*Phalangista vulpina*), ♂. Presented by Lieut. Daly.
2 Yellow-rumped Caciques (*Cacicus persicus*). Purchased.
1 Blue-bearded Jay (*Cyanocorax cyanopogon*). Purchased.
1 Teguexin Lizard (*Teius teguexin*). Purchased.
1 Tuberculated Lizard (*Iguana tuberculata*). Purchased.
1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Mrs. Mackinlay.
2 Marmoset Monkeys (*Hapale jacchus*). Presented by Mrs. Mackinlay.
1 Virginian Eagle Owl (*Bubo virginianus*). Presented by Dr. Palin.
17. 1 Collared Peccary (*Dicotyles tajacu*). Presented by Mrs. Guy.
20. 1 Vervet Monkey (*Cercopithecus lalandii*), ♀. Presented by Robert Aytoun, Esq.
1 Ground-Parrot (*Strigops habroptilus*). Deposited.
5 American White-winged Crossbills (*Loxia leucoptera*). Purchased.
21. 1 Crested Pigeon (*Ocyphaps lophotes*). Hatched in the Gardens.
1 Yellow Wagtail (*Motacilla flava*). Purchased.
22. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Savill Smith, Esq.
1 Marmoset Monkey (*Hapale jacchus*), ♂. Presented by Gen. Sir B. T. Phillips, K.C.B., F.Z.S.
1 Black-eared Marmoset (*Hapale penicillata*), ♀. Presented by Gen. Sir B. T. Phillips, K.C.B., F.Z.S.
1 Bare-faced Fruit-Pigeon (*Treron calva*). Presented by Gen. Sir B. T. Phillips, K.C.B., F.Z.S.
26. 1 Common Kingfisher (*Alcedo ispida*). Purchased.
3 Undulated Grass-Parrakeets (*Melopsittacus undulatus*). Hatched in the Gardens.
28. 1 Common Barn-Owl (*Strix flammea*). Presented by Mrs. Ferret.
1 Hawk's-billed Turtle (*Caretta imbricata*). Presented by R. Bellamy, Esq.
1 Smaller Grackle (*Gracula religiosa*). Presented by J. Richardson, Esq.
29. 2 Red and Blue Macaws (*Ara macao*). Presented by James Wright, Esq. From Tucacas, Venezuela.
2 Daubenton's Curassows (*Crax daubentoni*), ♂ and ♀. Presented by James Wright, Esq. From Tucacas, Venezuela (*v. a.*, p. 671).
30. 1 Ground-Hornbill (*Buceros abyssinicus*), ♂. Received in exchange.
1 Sooty Monkey (*Cercocebus fuliginosus*). Presented by General Osborne.

Oct. 1. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Arthur Rood, Esq.
2. 6 Sand-Lizards (*Lacerta agilis*). Presented by T. Coleman, Esq.
4 Spotted Salamanders (*Salamandra maculosa*). Presented by T. Coleman, Esq.
4 Edible Frogs (*Rana esculenta*). Presented by T. Coleman, Esq.
3. 1 Anubis Baboon (*Cynocephalus anubis*), ♂. Presented by M. Olivier.
1 Pig-tailed Monkey (*Macacus nemestrinus*), ♀. Presented by M. Olivier.
4. 2 Red-tailed Guans (*Ortalida ruficauda*). Presented by the Hon. W. J. Buhôt, M.D., M.R.C.S. From Tobago (*v. a.*, p. 796).

Oct. 4. 1 Vulpine Phalanger (*Phalangista vulpina*). Born in the Menagerie.

5. 5 Speckled Terrapins (*Clemmys guttata*). Presented by J. H. Thompson, Esq.
1 Painted Terrapin (*Clemmys picta*). Presented by J. H. Thompson, Esq.
3 North-American Box-Tortoises (*Terrapene carinata*). Presented by J. H. Thompson, Esq.
1 Alligator Terrapin (*Chelydra serpentina*). Presented by J. H. Thompson, Esq.

6. 1 Common Kingfisher (*Alcedo ispida*). Presented by E. H. Reynard, Esq.

8. 1 Australian Thicknee (*Œdicnemus grallarius*). Presented by Joshua Duke, Esq.

10. 1 Sun-bird (*Eurypyga helias*). Deposited by Miss Attwood.
2 Scarlet Ibises (*Ibis rubra*). Deposited by Miss Attwood.
1 Geoffroy's Cat (*Felis geoffroyii*), ♂. Purchased. From Paraguay (*v. a.*, p. 796).

11. 1 Common Badger (*Meles taxus*), ♂. Presented by J. B. Green, Esq.
2 Common Chameleons (*Chamæleon vulgaris*). Presented by F. M. Hayward, Esq.

14. 1 Black-handed Spider Monkey (*Ateles melanochir*), ♂. Purchased (*v. a.*, p. 797).
1 Brilliant Spider Monkey (*Ateles ornatus*), ♂. Purchased (*v. a.*, p. 797).
1 Golden Agouti (*Dasyprocta aguti*). Purchased.
1 Cape-Buffalo (*Bubalus caffer*), ♀. Received in exchange.

15. 2 Blaubocks (*Cephalophus pygmæus*), ♂. Presented by Dr. John Kirk, C.M.Z.S. From Zanzibar.
2 Argus Pheasants (*Argus giganteus*), ♂ and ♀. Deposited by Messrs. Smith, Fleming, and Co.

17. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Deposited by Miss Montgomery, F.Z.S.

18. 1 Carpet-Snake (*Morelia spilotes*). Presented by T. H. Vasey, Esq.
1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Deposited by C. P. Serocold, Esq., F.Z.S.
1 Black Bear (*Ursus americanus*), ♂. Presented by Col. Campbell and Officers of the 100th Regiment.

19. 1 Common Barn-Owl (*Strix flammea*). Deposited by Lucius Fitzgerald, Esq.
1 Common Heron (*Ardea cinerea*). Presented by A. Yates, Esq.
1 Pigeon-Hawk (*Hypotriorchis columbarius*). Presented by Capt. David Herd, C.M.Z.S.

23. 1 Syrian Fennec (*Canis famelicus*), ♂. Presented by Mrs. Rochat.

25. 1 Peregrine Falcon (*Falco peregrinus*). Presented by W. D. Dugdale, Esq.
1 European Tortoise (*Testudo græca*). Deposited.
2 Caspian Emys (*Emys caspica*). Deposited.
1 Derbian Sternothere (*Sternothærus derbianus*). Received in exchange.
1 Le Conte's Rattlesnake (*Crotalus lecontii*). Received in exchange.

26. 1 Spotted Cavy (*Cœlogenys paca*). Purchased.
1 Coati (*Nasua nasica*). Presented by Stanley Lucas, Esq.
1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*), ♀. Born in the Menagerie.

Oct. 26. 1 Prince Albert's Curassow (*Crax alberti*), ♂. Deposited by the Zoological Society of Amsterdam.

27. 1 Upland Goose (*Chloëphaga magellanica*), ♀. Received in exchange.

1 Common Barn-Owl (*Strix flammea*). Presented by E. Jones, Esq.

1 Egyptian Ichneumon (*Herpestes ichneumon*), ♂. Presented by R. P. Carrington, Esq., F.Z.S.

1 Cape Crowned Crane (*Balearica regulorum*). Presented by H. S. Mackenzie, Esq.

1 Scops Owl (*Scops senegalensis*). Presented by the Rev. W. E. Belson.

Nov. 3. 1 Grey Francolin (white var.) (*Francolinus ponticerianus*). Presented by Capt. M. Fitzgerald. From Bangalore, India.

1 Coati (brown var.) (*Nasua nasica*). Presented by Lieut. James Le Heane, R.N. From Acapulco, west coast of America.

8. 1 Moustache-Monkey (*Cercopithecus cephus*), ♂. Presented by Mr. F. Barnett.

1 Patas Monkey (*Cercopithecus ruber*), ♀. Deposited by H. Burmester, Esq.

1 Antarctic Wolf (*Canis antarcticus*), ♀. Presented by H. Byng, Esq. From the Falkland Islands (*v. a.*, p. 797).

9. 1 Javan Chevrotain (*Tragulus javanicus*). Born in the Menagerie.

10. 1 Grey Parrot (*Psittacus erithacus*). Received in exchange.
6 Mandarin Ducks (*Aix galericulata*). Received in exchange.

14. 1 Red-sided Green Lory (*Eclectus polychlorus*). Deposited by Mrs. Arscott.

1 Common Buzzard (*Buteo vulgaris*). Presented by W. Jones, Esq.

16. 1 Water-Rail (*Rallus aquaticus*). Presented by C. Chignall, Esq. Captured at sea.

17. 2 Malabar Squirrels (*Sciurus purpureus*). Presented by G. S. Rodon, Esq. From Malabar.

1 Wanderoo Monkey (*Macacus silenus*). Presented by J. W. Busteed, Esq.

1 Proteus (*Proteus anguinus*). Presented by T. Threlfall, Esq. From the Cave of Adelsberg.

18. 2 Bennett's Wallabies (*Halmaturus bennettii*). Presented by Jas. Campbell, Esq.

22. 1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Presented by John Bruce, Esq. From Eastern Africa.

1 Macaque Monkey (*Macacus cynomolgus*), ♂. Deposited by Dr. Douglas.

2 Barred-tailed Pheasants (*Phasianus reevesii*), ♂ and ♀. Deposited by R. Swinhoe, Esq., F.Z.S.

28. 1 Derbian Wallaby (*Halmaturus derbianus*), ♀. Deposited by F. S. Blunt, Esq.

1 Grey Ichneumon (*Herpestes griseus*), ♀. Presented by Capt. C. Rooke.

1 Bengalese Ichneumon (*Herpestes malaccensis*). Presented by Capt. C. Rooke.

29. 1 Chacma Baboon (*Cynocephalus porcarius*). Presented by W. F. Harold, Esq.

30. 1 Vervet Monkey (*Cercopithecus lalandii*), ♀. Deposited by Sir A. K. Macdonald.

Dec. 2. 2 Gray's Jerboa Kangaroos (*Bettongia grayi*). Deposited.
1 Upland Goose (*Chloëphaga magellanica*), ♂. Presented by H. W. Peek, Esq., M.P., F.Z.S.
1 Green Monkey (*Cercopithecus callitrichus*), ♀. Deposited.
5. 1 Great American Egret (*Egretta leuce*). Purchased.
1 Dingo (*Canis dingo*), ♂. Presented by C. H. Wigram, Esq.
1 Yellow-winged Conure (*Conurus virescens*). Presented by Mrs. Grant Duff.
3 Maugé's Dasyures (*Dasyurus maugæi*), 1 ♂ and 2 ♀. Presented by Capt. Thacker.
6. 1 Garden Tree-Boa (*Corallus hortulanus*). Purchased.
1 Say's Snake (*Coronella sayi*). Purchased.
1 Three-toed Amphiuma (*Amphiuma tridactylum*). Purchased (*v.* P. Z. S. 1871, p. 36).
1 Bateleur Eagle (*Helotarsus ecaudatus*). Deposited by T. G. H. Price, Esq.
8. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Capt. G. F. Parsons.
1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Capt. J. W. Sherwood.
10. 1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Presented by Rd. Jeffs, jun., Esq.
13. 1 Cinereous Sea-Eagle (*Haliaëtus albicilla*). Presented by Earl De Grey and Ripon, K.C.B.
1 Praslin Parrakeet (*Coracopsis barklyi*). Received in exchange (*v.* P. Z. S. 1871, p. 36).
14. 2 Common Wild Ducks (*Anas boschas*), ♂ and ♀. Deposited.
1 Peregrine Falcon (*Falco peregrinus*). Presented by James Weller, Esq.
15. 7 Siskins (*Fringilla spinus*). Purchased.
1 Mountain-Finch (*Fringilla montifringilla*). Purchased.
16. 1 Brazilian Tortoise (*Testudo tabulata*). Purchased.
3 Long-tailed Box-Tortoises (*Cinosternon longicaudatum*). Purchased.
1 One-bearded Podocnemis (*Podocnemis unifilis*). Purchased. From Purus, Upper Amazon.
1 Expanded Podocnemis (*Podocnemis expansa*). Purchased. From the Lower Amazon.
17. 1 Erxleben's Monkey (*Cercopithecus erxlebeni*). Purchased (*v.* P. Z. S. 1871, p. 36).
1 Pluto Monkey (*Cercopithecus pluto*). Purchased (*v.* P. Z. S. 1871, p. 36).
1 Malbrouk Monkey (*Cercopithecus cynosurus*). Purchased.
20. 1 Virginian Eagle Owl (*Bubo virginianus*). Deposited.
1 Piping Guan (*Pipile cumanensis*). Purchased. From the Rio Cassiquiare (*v.* P. Z. S. 1871, p. 36).
21. 1 Red Kangaroo (*Macropus rufus*). Born in the Menagerie.
23. 2 North-American Tortoises (*Testudo polyphemus*). Purchased.
2 Wrinkled Terrapins (*Emys rugosa*). Purchased.
4 American Box-Tortoises (*Terrapene carinata*). Purchased.
2 Blue-beaked Grossbeaks (*Spermospiza hæmatina*), ♂ and ♀. Purchased.
28. 1 Azara's Opossum (*Didelphys azaræ*). Purchased.
29. 1 Striped Hyæna (*Hyæna striata*). Presented by Dr. Waghorn. From Arabia.

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